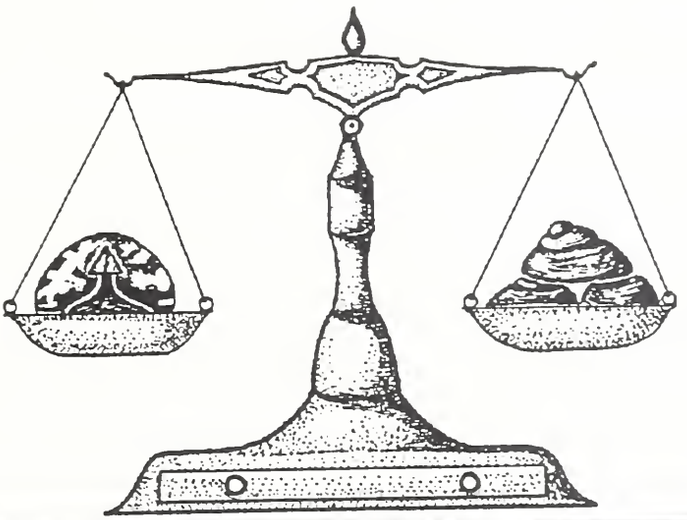
The Scale



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EDITOR'S NOTES

In years past the Systematic Entomology Laboratory has covered the full cost of "The Scale." This year John Davidson and the Department of Entomology, University of Maryland, have assumed the costs of duplication. I extend to them special thanks for their assistance while the Laboratory is short of funds.

We are pleased to have contributions from a wider array of "Scale" readers this year and hope that this trend will continue in the future. It would be nice to have reports from the various locations especially concerning "newsy" kinds of information. In general we receive this information only from Beltsville and Blacksburg. I know from having visited The Natural History Museum, London; The Zoological Institute in St. Petersburg; and from having visitors from many other locations that many interesting coccidological events are occurring that would interest "Scale" readers. Please consider providing an article next year.

NEWS FROM BELTSVILLE

The most note worthy event to happen at Beltsville, is that Dug Miller has finally stepped down as the Research Leader of the Systematic Entomology Laboratory after nearly nine years of having served in this capacity. This means that he now will be able to devote full time to research and scale insects. All in all, this is a positive event that has put a smile back on his face. One of the unfortunate ramifications of this change is that Gary Miller no longer will be working on scale insects, but instead will be helping the new Research Leader, Manya Stoetzel, with her research in aphidoids. It is an opportunity for Gary to learn about another homopteran group, but it is a negative for coccidology since Gary has made many important contributions in the past several years.

Some of the research that is now being actively pursued is a paper with Doug Williams on *Micrococcus*, a paper with Bill Gimpel on the *Pseudococcus affinis* complex, a paper with Gary Miller and Evelyna Danzig on the phylogeny of the diaspidoids, a book with John Davidson on the economic armored scales of the United States and some miscellaneous work on eriococcids. We also are in the process of developing a database that will be a species level inventory of the scale insects in the collection at Beltsville.

SHORT COURSE ON THE ECONOMIC SCALE INSECTS OF THE U.S.

John Davidson, at the University of Maryland is organizing the next scale insect short course, which will be given in College Park immediately after the Scale Symposium in Israel. If you are interested in the details John's address is: Dr. John A. Davidson, Department of Entomology, Symons Hall, University of Maryland, College Park, MD 20742 USA.

ISSIS -- VII

The Seventh International Symposium of Scale Insect Studies is scheduled to begin June 12, 1994 at the campus of the Vocani Center, in Bet Dagan, Israel. More than 50 colleagues from over 20 different countries are expected to attend. For more information contact Dr. Yair Ben-Dov, The Volcani Center, P.O. Box 6, Bet Dagan 50250, Israel.

IMPORTANT INFORMATION FROM ARGENTINA

I have just received some important correspondence from Lucia Claps in Argentina that I thought would be of general interest to everyohe.

April 6, 1993

"I am writing to tell you that my dissertation "Contribution to the knowledge of Diaspididae (Homoptera; Coccoidea) in the Province of Tucuman (Argentina)" has been completed in 1992. It includes 33 genera, 41 known species, and 8 new species in the following genera; Aonidomytilus, Crenulaspidiotus, Diaspidiotus, Eudinaspis, Melanaspis, Nuculaspis, and Rugaspidiotus. The following are described and illustrated in detail for the first time: Dinaspis lahillei Leonardi; Eudinaspis jorgenseni Lizer and Trelles; Lepidosaphes espinosai Porter; Protargionia larreae Leonardi and a new combination is postuled. All are neotropical species. A dichotomus key for the recognition of the genera is presented. The last contributions to this family in this region were 1963 in which only 14 genera and 20 species were cited for Tucuman. These numbers have now increased to 33 and 49 respectively. We register 99 host species distributed in 44 families: 40 Angiospermae, 3 Gymnospermae and 1 Pteridophyta."

"As for my regular work, I should like to say that I was happy as well as honored to receive a scholarship from Fundacao de Amaparo a Pesquisas do Estado do Sao Paulo (FARESP), Brazil from October 1st, to December 15th, 1992. I curated the Hempel and Pinto da Fonseca collection in the Zoological Museum in Sao Paulo, Brazil. On the same occasion, I had the chance to study the collections at the Sao Paulo Biological Institute, National Museum and Oswaldo Cruz Institute of Rio de Janeiro and the Parana University, Curitiba. I found varied as well as relevant type material. I should be very much obliged if you would publish in "The Scale" the list of type material that I studied during my stay in Brazil. Before saying goodbye, I should like to say a word on behalf of another young and very promising professional by the name of Maria Elizabeth de Haro Barbas, who is now working on Dactylopiidae. She has only recently been awarded a grant by the CONICET (The National Council of Technical and Scientific Research) to start her PhD. studies as a full-time student."

Dra. Lucia E. Claps, Instituto Superior de Entomologia, Universidad Nacional de Tucuman, Miguel Lillo 205-4000, S.M. de Tucman - Argentina.

BRAZILIAN TYPES

She also has provided information on the types that she has discovered in various collections in Brazil. The title of her paper is "Lista de tipos y cotipos de Coccoidea depositados en colecciones entomologicas de instituciones de Brasil."

MUSEU DE ZOOLOGIA
UNIVERSIDADE DE SAO PAULO (USP)

COLECCION PINTO DA FONSECA

DIASPIDIDAE

Diaspis amantei Fonseca, 1973 Cotipo (1 slide)
Diaspis muntingii Fonseca, 1973 Cotipo (2 slides)
Diaspis cuneatus Vernalha, Rocha y Gabardo, 1965 Cotipo (8 slides)
Furcaspis biformis taquarae Fonseca, 1969 Cotipo (2 slides)
Furcaspis plana Hempel, 1937 Tipo (6 slides)

Melanaspis bondari Lepage y Giannotti, 1943 Tipo (1 slide)
Melanaspis santensis Lepage, 1935 Tipo (1 slide)

Mesoselenaspisdus andersoni Fonseca, 1969 Cotipo (1 slide)

Neoischnaspis orthosoma Fonseca, 1969 Cotipo (2 slides)

Niveaspis hempeli Lepage, 1935 Tipo (1 slide)

Pseudaulacaspis sordidus Hempel, 1932 Tipo (1 slide)

Pseudischnaspis linearis Hempel, 1900 Tipo (1 slide)

Pseudoparlatoria constricta Fonseca, 1969 Cotipo (1 slide)
Pseudoparlatoria fusiformis Fonseca, 1969 Cotipo (4 slides)
Pseudoparlatoria rossettae Fonseca, 1969 Cotipo (6 slides)
Pseudoselenaspidus inermis Fonseca, 1962 Cotipo (6 slides)

Umbaspis regularis brasiliensis Fonseca, 1969 Cotipo (8 slides)

Vinculaspis atibaiensis Lepage, 1937 Tipo (1 slide)
Vinculaspis cheloniformis Lepage, 1937 Tipo (3 slide)
Vinculaspis mamillatus Fonseca, 1973 Cotipo (4 slides)

COCCOIDEA excluido DIASPIDIDAE

Alechanochiton marquesi Tipo

Anopulvinaria cephalocarinata Fonseca. Cotipo (4 slides)

Ceroplastes rarus Hempel. Tipo 20 (95.003) Hembra
Ceroplastes speciosus Hempel. Tipo 90 (95.148) Hembra
Ceroplastes formosus Hempel. Tipo 79 (95.137) Hembra
Ceroplastes communis Hempel. Tipo 35 (95.038) Hembra
Ceroplastes cultus Hempel. Tipo 82 (95.140) Hembra
Ceroplastes cuneatus Hempel. Tipo 80 (95.138) Hembra
Ceroplastes fornicarios Hempel 345a Tipo 89 (95.147) Hembra
Ceroplastes grandis Tipo 84 - 271b Hembra
Ceroplastes itatiyensis Hempel. Tipo
Ceroplastes novaesi Hempel. Tipo 141 (95.020) Hembra
Ceroplastes novaesi Hempel. Tipo 141 (95.149) Juvenil
Ceroplastes novaesi Hempel. 245 Tipo 131 Juvenil
Ceroplastes purpurens Hempel. Tipo 41 (95.046) Hembra

Ceroplastes rotundus Hempel. Tipo 81 (95.139) Hembra
Ceroplastes variegatus Hempel. Tipo 48 (95.083) Hembra
Ceroplastes variegatus Hempel. Tipo 49 (95.084) Hembra

Coccus brasiliensis Fonseca (4272; 4126) Cotipo (2 slides)

Edwalia rugosa Hempel. Tipo 39 (95.044) Hembra
Edwalia rugosa Hempel. Tipo 39 (95.044) Hembra

Eucalymnatus delicatus Hempel. Tipo
Eulecanium melzeri Tipo 19.938

Inglisia australis Hempel. Tipo

Lecanium campomanesia Hempel. Tipo 30 (95.031) Hembra
Lecanium discoides Tipo 63 Hembra (2 slides)
Lecanium durum Tipo 61 Hembra (2 slides)
Lecanium eugeniae Hempel. Tipo 27 Hembra (2 slides) + 1 Tipo 27 Juvenil
Lecanium ganthoxylum Tipo 68 Hembra (2 slides)
Lecanium glanulosum Tipo 62 Hembra (2 slides)
Lecanium jaboticabae Tipo 1533 Hembra
Lecanium mayteni Tipo 75 Hembra + Tipo 75 Juvenil
Lecanium obscurus Cotipo 36 hembra
Lecanium ornatum Tipo 1546 Hembra
Lecanium silveirai Hempel. Tipo 45 (95.069) Hembra
Lecanium testudinis Tipo 20.095 (2 slides)
Lecanium transversum Tipo 1545 Hembra
Lecanium transversum Cotipo 1535

Lichtensi alternata Tipo 95 Hembra

Mesolecanium marmoratum Hempel. Tipo 1343 (95.229)
Mesolecanium uvicola Tipo 19.951

Neolecanium silvestre Tipo 249.b

Neolecanochiton grevilleae Hempel. Tipo

Parakermes brasiliensis Fonseca Cotipo (8 slides)
Parakermes brasiliensis Fonseca. Lectotipo (1 slide)
Parakermes brasiliensis Fonseca. Paralectotipo (3 slides)

Pendularia pendens Fonseca Cotipo (8 slides)
Pendularia pendens Fonseca Cotipo (6 slides) larvas
Pendularia pendens Fonseca Ovos

Perilecanium ocultus Fonseca Cotipo (11 slides)
Perilecanium urbanus Fonseca Cotipo (10 slides)

Pulvinaria alboinducta Fonseca Cotipo (11 slides)
Pulvinaria cassariae Fonseca Lectotipo
Pulvinaria cassariae Fonseca Paralectotipo (2 slides)
Pulvinaria cassariae Fonseca Cotipo (3 slides)
Pulvinaria depresa Hempel. Tipo 72. (95.135) Hembra
Pulvinaria ficus Hempel Tipo 43 (95.134) Hembra. Cotipo 43 (95.052) Hembra.
Pulvinaria eugeniae Hempel. Cotipo 26 (95.024) (4 slides) Hembra
Pulvinaria eugeniae Hempel. Tipo 40 (95.045) Hembra

Pulvinaria eugeniae Hempel. Cotipo 26. Juvenil
Pulvinaria eugeniae Hempel. Tipo 40 Hembra. Tipo juvenil
Pulvinaria globosa Fonseca Cotipo (26 slides)
Pulvinaria grandis Tipo 31. juvenil
Pulvinaria justaserpentina Fonseca Cotipo
Pulvinaria minuta Fonseca Cotipo (3 slides)
Pulvinella pulchella Hempel 265 Tipo 29 (95.029) Hembra
Pulvinella pulchella Hempel. 265 Tipo 29 (95.029) Juvenil

Saissetia infriquens Hempel. Tipo 1899 (95.074) Hembra

Tectopulvinaria albata Hempel. Tipo (95.102; 95.108) (2 slides) Hembra
Tectopulvinaria albata Hempel. Tipo (95.102) Macho
Tectopulvinaria albata Hempel. Tipo (95.136) Juvenil

COLECCION HEMPEL

DIASPIDIDAE

Acutaspis paulista (Hempel, 1900). Tipo 203 (242) Hembra (2 slides) - Ninfas (1 slide). Macho adulto (1 slide). Pupa (1 slide)
Acutaspis paulista (Hempel, 1900). Cotipo 203 (31544) Hembra

Diaspidistis squamosa Hempel. Cotipo

Hemidiaspis multilobis Tipo 1549 Macho
Hemidiaspis multilobis Hempel. Tipo 1550 Hembra.

Odonaspis janeirensis (Hempel, 1900) Tipo 1540. Hembra (1 slide)

INSTITUTO BIOLOGICO DE SAO PAULO

DIASPIDIDAE

Acutaspis oliveirai Lepage y Giannotti. Tipo. 1 slide

Aonidiella eugeniae Hempel. Tipo. 1 slide

Aspidiotus fonsecai Giannotti. Tipo. 2 slides
Aspidiotus pizai Hempel. Tipo. 1 slide

Diaspidistis squamosa Hempel. Tipo. 1 slide

Diaspis alba Fonseca. Cotipo (853). 1 slide
Diaspis cuneatus Vernalha, Rocha y Gabardo. Cotipo (859). 3 slides
Diaspis minensis Hempel. Tipo. 1 slide
Diaspis muntingii Fonseca. Cotipo (863). 6 slides
Diaspis paulista Lepage y Giannotti. Tipo. 2 slides

Dinaspis paulistana Lepage. Tipo. 1 slide

Dynaspidiotus sanctandelaidea Lepage. Tipo. 1 slide

Furcaspis biformis taquarae Fonseca. Cotipo (860). 2 slides
Furcaspis plana Hempel. Tipo (R. 720). 3 slides

Melanaspis aristotelesi Lepage y Giannotti. Tipo. 2 slides
Melanaspis bondari Lepage y Giannotti. Tipo. 2 slides
Melanaspis figueiredoi Lepage. Tipo. 2 slides
Melanaspis martinsi Lepage. Tipo. 2 slides

Mesoselenaspidus andersoni Fonseca Cotipo (487). 3 slides

Mycetaspis brasiliensis Hempel. Tipo. 1 slide
Mycetaspis juventinae Lepage y Giannotti. Tipo. 4 slides

Neoselenaspidus orthosoma Fonseca. Cotipo (850). 2 slides

Niveaspis cattleyae Lepage. Tipo. 1 slide
Niveaspis hempeli Lepage. Tipo. 3 slides
Niveaspis insularis Lepage. Tipo. 1 slide

Odonaspis janeirensis Hempel. Tipo (828) 1 slide

Pseudaulacaspis australis Hempel. Tipo. 1 slide
Pseudoparlatoria aberrans Lepage. Tipo. 1 slide
Pseudoparlatoria campinensis Lepage y Giannotti. Tipo. 3 slides
Pseudoparlatoria circularis Lepage. Tipo. 3 slides
Pseudoparlatoria constricta Fonseca. Cotipo (868). 2 slides
Pseudoparlatoria fusiformis Fonseca. Cotipo (851). 8 slides
Pseudoparlatoria multipunctata Lepage y Giannotti. Tipo. 1 slide
Pseudoparlatoria rossettae Fonseca. Cotipo (857). 4 slides
Pseudoparlatoria trimaculata Lepage y Giannotti. Tipo. 1 slide

Pseudoselenaspidus inermis Fonseca. Cotipos. 3 slides

Umbaspis regularis brasiliensis Fonseca. Cotipos (849). 3 slides

Vinculaspis atibaiensis Lepage. Tipo. 3 slides
Vinculaspis cheloniformis Lepage. Tipo. 6 slides
Vinculaspis eugeniae Lepage. Tipo. 2 slides
Vinculaspis mamilatus Fonseca. Cotipo (865). 4 slides

COCCOIDEA - Excluido DIASPIDIDAE

Aclerda campinensis Hempel. Tipo (R 171). 2 slides
Aclerda santensis Hempel. Tipo (R 171). 2 slides

Aculeococcus morrisoni Lepage. Tipo 3 slides

Akermes riograndensis Hempel. Tipo (440). 2 slides

Anopulvinaria cephalocarinata Fonseca. Cotipo (7-1972). 7 slides

Asterolecanium bondari Lepage. Tipo. 4 slides
Asterolecanium saubernardensis Hempel. Tipo (R 279). 4 slides

Cerococcus catenarius Fonseca. Cotipo (4205). 12 slides

Ceroplastes deodorensis Hempel. Tipo (R. 360). 1 slide
Ceroplastes diospyros Hempel. Tipo (R. 2) 1 slide
Ceroplastes gregarius Hempel. Tipo (R. 537). 1 slide

Coccus brasiliensis Fonseca. Cotipo (4127) 6 slides. (4272) 3 slides. (4274) 4 slides

Conchaspis baiensis Lepage. Tipo. 2 slides
Conchaspis diplothemii Lepage y Giannotti. Tipo. 3 slides
Conchaspis lepagei Hempel. Tipo (R. 105). 1 slide
Conchaspis lepagei Hempel. Tipo. 3 slides

Eriococcus peptadeniae Hempel. Tipo (R. 710). 1 slide

Inglisia australis Hempel. Tipo (R 712). 4 slides

Lecanium lizeri Fonseca. Cotipo (4283) 7 slides
Lecanium transparens Hempel. Tipo (R. 713) 1 slide

Luzulaspis saneri Lepage y Giannotti. Tipo. 2 slides

Mesolecanium tanum Hempel. Tipo (R. 479). 1 slide

Neocoelostoma xerophila Hempel. Tipo (re. 6) 3 slides

Neolecanochiton grevillea Hempel. Tipo (R. 532). 4 slides

Parakermes brasiliensis Fonseca. Cotipo (R 867). 5 slides

Perilecanium occultus Fonseca. Cotipo (830). 11 slides
Perilecanium urbanus Fonseca. Cotipo (855). 6 slides

Protortonia novasi Fonseca. Cotipo (872). 11 slides

Pseudalichtensia brasiliae Hempel. Tipo (R. 3) 3 slides

Pulvinaria alboinducta Fonseca. Cotipo (824). 11 slides
Pulvinaria cassariae Fonseca. Cotipo (854). 8 slides
Pulvinaria globosa Fonseca. Cotipo (831). 23 slides
Pulvinaria justaserpentina Fonseca. Cotipo (862). 4 slides
Pulvinaria minuta Fonseca. Cotipo (848). 5 slides

Saissetia minensis Hempel. Tipo (R. 465). 3 slides

Tachardiella nigra Fonseca. Cotipo (870). 6 slides

Toumeyella paulista Hempel. Tipo (R. 93). 3 slides

UNIVERSIDAD FEDERAL DO PARANA - CURITIBA
DEPARTAMENTO DE ZOOLOGIA

DIASPIDIDAE

COLECCION INSTITUTO DE BIOLOGIA E PESQUISAS TECNOLOGICAS

Diaspis cuneatus Vernalha, Rocha y Gabardo, 1965 -Tipo (11 slides)

Niveaspis lepagei Giannotti, 1942 - Tipo (1 slide)

COLECCION LEPAGE

Acutaspis litorana (Lepage, 1942) - Tipo (3 slides)
Acutaspis oliveirae (Lepage y Giannotti, 1942) - Tipo (1 slide)

Aspidiotus fonsecai Giannotti, 1942 - Tipo (3 slides)

Costalimaspis atibaiensis Lepage, 1937 - Tipo (13 slides)
Costalimaspis cheloniformis Lepage, 1937 - Tipo (15 slides)
Costalimaspis eugeniae Lepage, 1937 - Tipo (12 slides)

Dinaspis paulistana Lepage, 1942 - Tipo (2 slides)

Dynaspidiotus sanctandelaidae Lepage, 1942 - Tipo (1 slide)

Melanaspis araucariae Lepage, 1942 - Tipo (2 slides)
Melanaspis aristotelesi Lepage y Giannotti, 1944 - Tipo (4 slides)
Melanaspis bondari Lepage y Giannotti, 1943 - Tipo (4 slides)
Melanaspis figueiredoi Lepage, 1942 - Tipo (5 slides)
Melanaspis martinsi Lepage, 1942 - Tipo (3 slides)
Melanaspis santensis Lepage, 1942 - Tipo (2 slides)

Mycetaspis juventinae Lepage y Giannotti, 1944 - Tipo (6 slides)

Niveaspis cattleyae Lepage, 1942 - Tipo (6 slides)
Niveaspis hempeli (Lepage, 1935) - Tipo (10 slides)
Niveaspis insularis Lepage, 1939 - Tipo (6 slides)
Niveaspis lepagei Giannotti, 1942 - Tipo (3 slides)

COLECCION HEMPEL

Acutaspis paulista (Hempel, 1900) - Tipo (1 slide) Cotipo (3 slides)

Aonidiella eugeniae Hempel, 1937 - Tipo (3 slides)
Aspidiotus moreirai Hempel, 1904 - Tipo (2 slides)
Aspidiotus pisai Hempel, 1904 - Tipo (3 slides)
Aspidiotus pisai + Aspidiotus moreirai - Tipo (1 slide)

Diaspis australis Hempel, 1900 - Tipo (1 slide)

Diaspidistis squamosa Hempel, 1937 - Tipo (1 slide)

Diaspis minensis Hempel, 1918 - Tipo (3 slides)

Furcaspis plana Hempel, 1937 - Tipo (4 slides)

Hemidiaspis multilobis Hempel, 1900 - Tipo (1 slide)

Melaraspis citreana (Hempel, 1932) - Tipo (1 slide)

Mycetaspis brasiliensis Hempel, 1932 - Tipo (1 slide)

Odonaspis janeirensis (Hempel, 1900) - Tipo (1 slide)

COLECCION INSTITUTO BIOLOGICO SAO PAULO

Diaspis cuneatus Vernalha, Rocha y Gabardo, 1965 - Cotipo (2 slides)

Furcaspis plana Hempel, 1937 - Tipo (1 slide)

Mesoselenaspidus andersoni Fonseca, 1969 - Cotipo (2 slides)

Neoischnaspis orthosoma Fonseca, 1969 - Cotipo (1 slide)

Pseudoselenaspidus inermis Fonseca, 1962 - Cotipo (2 slides)

Umbaspis regularis brasiliensis Fonseca, 1969 - Cotipo (1 slide)

COCCOIDEA excluido DIASPIDIDAE

COLECCION INSTITUTO DE BIOLOGIA E PESQUISAS TECNOLOGICAS

Coccus brasiliensis - Cotipo (1 slide)

Icerya floculosa - Cotipo (1 slide)

Neolecanochiton grevillea - Tipo (1 slide)

Perilecanium ocultus - Cotipo (1 slide)

Pseudococcus inamabilis - Cotipo (1 slide)
Pseudococcus magnoliae - Cotipo (1 slide)
Pseudococcus sociabilis - Cotipo (1 slide)

Pseudokermes palmae - Tipo (1 slide)

Pulvinaria alboinducta - Cotipo (1 slide)
Pulvinaria globosa - Cotipo (1 slide)

Toumeyella paulista - Tipo (1 slide)

COLECCION LEPAGE

Aclerda santensis - Tipo (1 slide)

Aculeococcus morrisoni - Tipo (12 slides)

Asterolecanium bondari - Tipo (5 slides)

Conchaspis baiensis - Tipo (9 slides)
Conchaspis diplothemii - Tipo (7 slides)
Conchaspis lepagei - Tipo (5 slides)

COLECCION INSTITUTO BIOLOGICO DE SAO PAULO

Akermes riograndensis - Tipo (1 slide)

Ancoulvinaria cephalocarinata - Cotipo (1 slide)

Coccus brasiliensis - Cotipo (1 slide)

Eriococcus setadeniae - Tipo (1 slide)

Eucalymnatus hirsutus - Tipo (1 slide)
Eucalymnatus rigidus - Tipo (1 slide)

Icerya floculosa - Tipo (2 slides)
Icerya insulans - Tipo (1 slide)

Inglisia australis - Tipo (1 slide)

Lecanium lizeri - Cotipo (1 slide)

Luzulaspis saneri - Tipo (6 slides)

Mesolecanium planum - Tipo (1 slide)

Neocoelostoma xerophila - Tipo (1 slide)

Parakermes brasiliensis - Cotipo (1 slide)

Perilecanium ocultus - Cotipo (1 slide)
Perilecanium urbanus - Cotipo (1 slide)

Pseudococcus inquilinus - Tipo (1 slide)
Pseudococcus sociabilis - Cotipo (1 slide)

Pulvinaria cassariae - Cotipo (1 slide)
Pulvinaria globosa - Cotipo (1 slide)
Pulvinaria justaserpentina - Cotipo (1 slide)
Pulvinaria paranaensis - Tipo (1 slide)

Tachardiella ourinhensis - Tipo (1 slide)

Toumeyella paulista - Tipo (1 slide)

Trionymus minutus - Tipo (1 slide)
Trionymus rusticus - Tipo (1 slide)

COLECCION HEMPEL

Apiococcus asperatus - Tipo (1 slide)
Apiococcus globosus - Tipo (1 slide)
Apiococcus gregarius - Tipo (2 slides)
Apiococcus singularis - Tipo (2 slides)

Capulinia crateroformis - Tipo (1 slide)
Capulinia jaboticabae - Cotipo (7 slides)

Carpochloroides viridis - Cotipos (5 slides)

Cryptokermes brasiliensis - Tipo (3 slides)

Dactylopius grandis - Tipos (2 slides)
Dactylopius secretus - Tipo (3 slides)
Dactylopius setosus - Tipo (1 slide)
Dactylopius subterraneus - Tipo (1 slide)

Edwalia rugosa - Tipo (3 slides)

Eriococcus armatus - Tipo (1 slide)
Eriococcus brasiliensis - Cotipo (2 slides)
Eriococcus perplexus - Tipo (1 slide)

Icerya brasiliensis - Tipo (3 slides)
Icerya schrottkyi - Tipo (1 slide)

Lichtensia argentata - Tipo (1 slide)
Lichtensia attenuata - Tipo (1 slide)

Margarodes vitis - Tipo (1 slide)

Mesolecanium inflatum - Tipo (2 slides)

Phenacoccus spiniferus - Tipo (2 slides)

Pulvinaria convexa - Tipo (2 slides)
Pulvinaria depressa - Tipo (1 slide)
Pulvinaria eugeniae - Tipo (2 slides) - Cotipo (5 slides)
Pulvinaria ficus - Tipo (1 slide) - Cotipo (2 slides)
Pulvinaria grandis - Tipo (2 slides)
Pulvinaria pulchella - Tipo (3 slides)

Rhizococcus perplexus - Tipo (1 slide)

Stigmacoccus asper - Tipo (2 slide)

Tachardia caerulea - Tipo (1 slide)
Tachardia cydoniae - Tipo (2 slides)
Tachardia ingae - Tipo (1 slide)
Tachardia parva - Tipo (2 slide)
Tachardia rosae - Tipo (1 slide)
Tachardia rubra - Tipo (2 slides)

Tectococcus ovatus - Tipo (2 slides)

Tectopulvinaria albata - Tipo (5 slides)

ERRATA

Yair Ben-Dov. 1993. **A Systematic Catalogue of the Soft Scale Insects of the World (Homoptera: Coccoidea: Coccidae) with data on geographical distribution, host plants, biology and economic importance. Sandhill Crane Press, Gainesville, Florida. 536 pp.**

The users of this catalogue are kindly requested to consider several errors and typing errors which occurred in it. In order to avoid further use of the errors in future publications, these are listed below. I am very grateful to my colleagues for drawing my attention to the errors. Special thanks are due to Drs. Doug Williams, London and Chris Hodgosn, Wye, England, for their kind cooperation.

Yair Ben-Dov, Bet Dagan, Israel, October, 1993

Page	Line from top	Printed	Correct to:
xxiv	9	*Stozia*	*Stotzia*
xxv	5	coccidologits	coccidologists
5	4	Nassonov, 1909	Nassonov, 1908
11	41	*Lecaniodiaspis*	*Lecanodiaspis*
12	2	*Lecaniodiaspis*	*Lecanodiaspis*
21	3	Manaos	Manaus
33	15	*eugeniae* Hodgson, 1969a: 4.	*eugeniae* Hall; Hodgson, 1969a: 4.
53	47	secereting	secreting
59	41	***vinsoni***	***vinsonii***
60	2	*vinsoni*	*vinsonii*
68	10	*C. bromelliae*	*C. bromeliae*
94	27	***Couturierina piptadeniastrae*** atile Ferrero & Le Ruyet	***Couturierina piptadeniastrae*** Matile-Ferrero & Le Ruyet
97	4	Italy.	**PALAEARCTIC REGION:** Italy.
153	12	***Kozáricoccus***	***Kozaricoccus***
153	16	***Kozáricoccus***	***Kozaricoccus***
158	7	Kozárzhevskaya	Kozarzhevskaya
161	13	Avita-gun	Arita-gun
168	1	KunashirIsland	Kunashir Island
168	20	***macrospinus*** Savescu	***macrospina*** Savescu
179	40	*Campomanesia*sp.	*Campomanesia* sp.
201	45	by present designation.	by Kosztarab et al. (1986).
228	33	***ocultus*** Fonseca	***ocultum*** Fonseca
229	3	***urbanus*** Fonseca	***urbanum*** Fonseca
229	40	***Philephedra broadwayi echinopsidis*** (Newstead) .comb.	correct to: ***Philephedra broadwayi echinopsidis*** (Newstead) n. comb.

Page	Line from top	Printed	Correct to:
239	26	*crustuliforme* (Green)	*crustuliformis* (Green)
248	13	1867: 13	1866b: 146
290	45	prsented	presented
323	41	*Stozia*	*Stotzia*
323	42	*Stozia*	*Stotzia*
323	43	*Stozia*	*Stotzia*
324	1	*Stozia*	*Stotzia*
324	3	*Stozia*	*Stotzia*
324	8	*Stozia*	*Stotzia*
324	10	*Stozia*	*Stotzia*
324	18	*Stozia*	*Stotzia*
324	32	*Stozia*	*Stotzia*
324	33	*Stozia*	*Stotzia*
338	7	*nitidulus* (De Lotto)	*nitidula* (De Lotto)
338	32	*stellifera*	*stellifer*
341	47	*egbara* (Cockerell)	*egbarum* (Cockerell)
342	11	*egbara fulleri*	*egbarum fulleri*
342	22	*egbara rhodesiensis*	*egbarum rhodesiensis*
419	20	4 (4): 1-45	4 (4): 1-42
430	1	sensilum	sensillum
441	7	*Zeitschrift*	*Jahrbuch*
441	9	*Zeitschrift*	*Jahrbuch*
441	11	*Zeitschrift*	*Jahrbuch*
453	8	**Miller, G.R**	**Miller, G.L.**
456	1	**Nassonov, N.V. 1909**	**Nassonov, N.V. 1908**
465	15	pharmacetique	pharmaceutique
468	14	*Quaintancii*	*quaintancii*
468	25	*Mesolecanium*	*Neolecanium*
485	5	*Entomolgical*	*Entomological*
486	29	de fico	del fico
487	10	11: 721-738	11: 694-738
491	7	*la Academie*	*l'Academie*
502	33	Stozia	Stotzia
509	16	Stozia	Stotzia
510	49	crustuliforme Green	crustuliformis Green
512	20	egbara rhodesiensis	egbarum rhodesiensis
512	21	egbara (Cockerell)	egbarum (Cockerell)
512	22	egbara fulleri	egbarum fulleri
512	23	egbara fulleri	egbarum fulleri
512	24	egbara rhodesiensis	egbarum rhodesiensis
512	50	Stozia	Stotzia
520	45	macrospinus Savescu	macrospina Savescu
521	43	Stozia	Stotzia
524	5	nitidulus (De Lotto)	nitidula (De Lotto)
524	33	ocultus Fonseca	ocultum Fonseca
535	12	vinsoni Signoret	vinsonii Signoret
535	13		Delete line 13

FREE REPRINTS FROM LSU

Joan Chapin from Louisiana State University writes: "I understand that you are the editor of a newsletter on Homoptera. The experiment station is reducing its backlog of publications, and we have many reprints of the Bulletin on armored scales of Louisiana. If you would run a notice in your newsletter of the availability of this publication, we would be glad to send copies to anyone who is interested." The citation to request is as follows: Howard, F. W. and A. D. Oliver. 1985. Armored scale insects of Louisiana. Louisiana Agricultural Experiment Station Bull. no. 767, 126 pp.

COCCIDOLOGY LAB., VIRGINIA POLYTECHNIC INSTITUTE

We still have not heard when we can fill the systematics position for our department, but once our head search is finished, we can campaign for another faculty position. Systematic research is still proceeding, despite the retirement of Michael Kosztarab. He and Mary Rhoades plan to complete a book on scale insects of the northeastern U. S. by the end of 1994. The last chapter is being typed now; then the manuscripts will be sent out for review. This project is part of a 5-year Hatch research project commitment.

The NSF supported project on the legless mealybugs of the world was completed as part of the Ph.D. research of Harlan Hendricks, and the results should be published next year. Both Harlan and Michael Kosztarab are scheduled to give talks for the ISSIS-VII meeting in Israel next year, where they hope to meet many colleagues.

Our insect collection had recent additions this year from several former graduate students, the State Natural Heritage Survey Program, and Ferrum College, which gave a wonderful collection of butterflies of the world. With these new additions the total holdings are approaching one million specimens, the amount apparently required for listing in future North American major insect collection inventories. This is real progress, considering we had only 70,000 specimens in 1962.

Doug Pfeiffer and Michael Kosztarab are providing book chapters for the Soft Scales in the World Crop Pest series of the Elsevier Publishing Company.

A new giant mealybug species, *Puto kosztarabi*, was described from Buffalo Mountain in Floyd County by Dougalss R. Miller and Gary L. Miller of the U.S.D.A. The description was published in the new journal Jeffersoniana of the Virginia Museum of Natural History. Unique aspects of this species include: 1) it took 16 years to collect all the stages of both sexes needed for the description; 2) until now species in this genus were unknown east of Texas; 3) although about 12 mountain tops and similar habitats in south and southwest Virginia were checked, the mealybug was not found, so this species appears to be endemic to the top of Buffalo Mountain. There are a few uncommon plant species which occur on the mountain also, and we hope that there will be some way of protecting this unusual habitat. The Nature Conservancy is looking into the mattter.

Karen Veilleux continues cataloging and indexing the world aphid and scale insect literature through funding from the U.S.D.A. Systematic Entomology Lab. Her yearly summary is printed in this issue.

Finally, the good news just reached us that the first scholarship award in systematics in our department will be given to Harlan Hendricks for his excellent Ph.D. dissertation work. The scholarship was initiated by friends and members of Michael Kosztarab's family in connection with his retirement

LITERATURE SEARCH

As usual the bulk of the information in this edition of "The Scale" comes from the folks at the Virginia Polytechnic Institute and State University. Karen Veilleux is continuing to do a fantastic job.

She writes: "Because this printout is so long, I would like to suggest that you include an introductory paragraph that reminds coccidologists that they can request a keyword search for a customized bibliography by contacting Dr. Kosztarab or me by Email at KVEILL@VTVMI.CC.VT.EDU " or sending a request to Karen Veilleux, Department of Entomology, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0319 USA."

"1, 326 articles, books or proceedings have now been indexed, and there are 7,882 records containing information on individual species, genera or families discussed within these articles." Michael Kosztarab adds that there will be a cost of about $15 per hour for each search which really is a minimal charge. Funds will be used for the payroll to continue literature searches in the future.

Karen continues, "Also, for anyone who might be dismayed to find omissions, all reprints or copies sent directly to us are processed as they come in, while those we have to seek, usually through interlibrary loan, become part of a more slowly moving backlog.

The new database and the number of records broken down by category follow:

SCBIB9 database:
216 main entry records

SCALE9 database:
899 species records
54 new species records
57 host records
58 distribution records
19 genera records
2 new genera records
9 family records
1 new combination record
35 biological information records
114 biological control records

RECENT LITERATURE

Adachi, I. & Korenaga, R. 1991. Fertility schedules of Unaspis-yanonensis (Hemiptera: Diaspididae) in relation to daily temperature. (Japan) Researches on Population Ecology 33(1):57-68. (In English, Japanese abstract)

Investigations covered 1962 to 1971 for first generation and 1964 to 1971 for second generation; fertility curves commonly characterized by a first major peak and a few subsequent minor peaks; estimated curves well fitted to observed ones.

Adachi, I. & Korenaga, R. 1992. A simulation model for the Arrowhead scale (Hemiptera: Diaspididae) population dynamics on citrus trees in relation to pest management programs. Researches on Population Ecology 34(1):155-171. (In English, Japanese abstract)

Population occurrence patterns of Unaspis yanonensis simulated by the model from 1971 to 1976 were relatively consistent with the actual findings in the field; effective timing of insecticide (petroleum oil and organophosphorous insecticide) established; effectiveness of Aphytis yanonensis and Coccobius fulvus.

Agnello, A.M., Spangler, S.M., Reissig, W.H., Lawson, D.S. & Weires, R.W. 1992. Seasonal development and management strategies for Comstock Mealybug (Homoptera: Pseudococcidae) in New York pear orchards. Journal of Economic Entomology 85(1):212- 225; ill.

Previously, control measures for Pseudococcus comstocki on Pyrus communis were not sufficient to alleviate nuisance to food handlers; this paper suggests revised chemical control methods.

Agricola, U., Agounke, D., Fischer, H. & Moore, D. 1990. Biology of the mealybug Rastrococcus invadens Williams (Hemiptera: Pseudococcidae) and its control with Gyranusoidea tebygi Noyes (Hymenoptera: Encyrtidae) in Togo. (Biologie des Schmierlaus Rastrococcus invadens Williams (Hemiptera: Pseudococcidae) und ihre Bekampfung mit Gyranusoidea tebygi Noyes (Hymenoptera: Encyrtidae) in Togo.) Mitteilungen der Deutschen Gesellschaft fur Allgemeine und Angewandte Entomologie 7(4-6):647-652. (In German, English abstract)

This mealybug was accidentally introduced into West Africa from southeast Asia; feeds on over 45 host plants and causes severe damage to mango, citrus and other fruit trees and ornamentals; effectiveness of the parasitoid Gyranusoidea tebygi discussed.

Ahmed, S.A. 1991. Heavy infestation of codling moth, aphid, scale insects and caterpillar on orchards in Balochistan Province of Pakistan. Quarterly Newsletter (Asia and Pacific Plant Protection Commission) 34(3-4):10-11.

Brief announcement; treatment plan; no economic losses.

Akinlosotu, T.A. & Kogbe, J.O.S. 1988. Studies on the incidence of yam scale, Aspidiella hartii on Dioscorea spp. and its chemical control. (Nigeria) Journal of Root Crops 14(2):21-23.

This species preferred D. alata over other species of yam; dip treatment of yam tubers with insecticides evaluated.

Alexandrakis, V. 1990. Effect of Dacus control sprays, by air or ground, on the ecology of Aspidiotus nerii Bouche (Hom. Diaspididae). (Greece) Acta Horticulturae (286):339-342.

Density of living insects of A. nerii was 1.7 times higher in the areas sprayed by air than in those sprayed by ground ones; indigenous ectoparasite A. chilensis has a high natural mortality ranging from 45% to 90% and is higher during late summer due to dry and hot weather; in the areas sprayed by ground 2.8 times more scales were destroyed by predators, of which the most important is C. bipustulatus.

Arancibia O., C., Sazo R., L. & Charlin C., R. 1990. Observations on the biology of Acacia scale, Diaspidiotus ancylus (Putnam) on white acacia Robinia pseudoacacia. (Observaciones de la biologia de la escama del acacio Diaspidiotus ancylus (Putnam) en acacia blanca (Robinia pseudoacacia).) (Chile) Simiente 60(2):106-108. (In Spanish, English abstract)

Development observed on nectarines, apples and pears; investigation shows that this species has two generations a year and overwinters as a second nymph stage; on artificially infested fruits, development does not go beyond second nymph stage.

Atiqui, M.U.A. & Murad, H. 1991. Life history mating sex ratio and and natural enemies of the guava mealy bug Ferrisia virgata Ckll. (Homoptera: Pseudococcidae). (India) Biologia (Bratislava) 46(6):513-518.

Female has three larval instars while the male has four including prepupa and pupa. Duration of different stages was recorded and tabulated; reproduction is through parthenogenesis; natural enemies.

Avasthi, R.K. & Shafee, S.A. 1989. First record of Naiacoccus serpentinus Green (Coccoidea: Psetdococcidae [Pseudococcidae?] from India. (India) Bulletin of Entomology 30(1):132-133; ill.

Heavy infestation of this species reported on Tamarix articulata; brief field description.

Avasthi, R.K. & Shafee, S.A. 1991. Revision of the genus Coccus Linn. in India (Insecta, Homoptera, Coccidae). Journal of the Bombay Natural History Society 88(3): 329-348; ill.

17 Indian species of this genus reviewed; key provided; detailed redescriptions of eight species and field descriptions of the others; hosts; distributions within India.

Badawi, A. & Al-Ahmed, A.M. 1990. The population dynamics of the oriental scale insect, Aonidiella orientalis (Newstead) and factors affecting its seasonal abundance. (Saudi Arabia) Arab Gulf Journal of Scientific Research 8(3):81-89. (In English, Arabic abstract)

Based on random samples of leaves taken about twice per month from four Ficus nitida trees; counts of living scales made on 1 sq. inch per each leaf surface; population at lowest level in summer; first peak of abundance at beginning of winter; temperature negatively and significantly correlated with population; sides of trees exposed to wind usually harbored smaller population.

Badiyala, S.D. & Garg, R. 1991. Grey armoured scale Thysanofiorina (Thysanofiorinia?) leeli Williams, a new pest of litchi in Himachal Pradesh. (India) Journal of Insect Science 4(1):94.

This species found on upper side of old leaves; maximum infestation was recorded on the lower and northern side of trees receiving minimum sunshine; most susceptible cultivars mentioned.

Badmin, J. 1992. Horse-chestnut scale Pulvinaria regalis Canard (Hem., Coccidae) in Kent. (Great Britain) Entomologist's Monthly Magazine 128:118.

Hosts include lime, sycamore, bay trees and horse chestnuts; prefers mature, well-established trees in well populated areas.

Baker, J.R. & Shearin, E.A. 1992. Fern scale insects. North Carolina Flower Growers 37(2):1-3; ill.

Pinnaspis aspidistrae are significant pests of true ferns; description of damage; brief field description of females and males; economic impact; biology; recommended chemical control.

Bar-Zakay, I., Peleg, B.A. & Chen, Ch. 1988. The spherical mealybug infesting citrus in Israel. In Citriculture: Proceedings of the Sixth International Citrus Congress: Middle-East, edited by R. Goren and K. Mendel. Tel Aviv: March 6-11, 1988. (Pests and their Management; Integrated Control in Citrus Growth; Postharvest Physiology and Pathology, Vol. 3.) Rehovot, Israel: Balaban; 1083-1087.

Nipaecoccus viridis infests and causes damage to citrus; Anagyrus indicus, Timberlakia signata and Nephus reunioni imported from South Africa for biological control.

Beardsley, J.W. & Tsuda, D.M. 1990. Marietta pulchella (Howard) (Hymenoptera: Aphelinidae), a primary parasite of Conchaspis angraeci Cockerell (Homoptera: Conchaspididae). In Proceedings of the Hawaiian Entomological Society. Honolulu, Hawaii: Dec. 31, 1990. 151-153; ill.

Angraecum scale; best known and most widely distributed species of this

family; found in Florida, West Indies, Central and South America; hosts include Acalypha spp., Codiaeum variegatum, Hibiscus rosa-sinensis, Nothopanax sp. and Pittosporum tobira; parasitoids include Ablerus sp., Marietta sp. and Zoamma sp.

Beattie, G.A.C., Clift, A.D., Allender, W.J. & Jiang, L. 1991. Efficacies of low- to high-volume (960-10 700 litre ha -1) citrus sprayers for applying petroleum spray oil to control Chinese wax scale. Pesticide Science 32:47-56.

Chemical control reccomendations for Ceroplastes sinensis on Valencia orange trees on trifoliata orange (Poncirus trifoliata).

Bellotti, A.C. & Vargas, H.O. 1991. Recent advances in host plant resistance studies with whiteflies and mealybugs on cassava at Ciat. Resistant Pest Management 3(2):17.

Phenacoccus herrenit can cause losses as high as 88% in cassava; six tolerant or moderately resistant clones identified.

Ben-Dov, Y. & Russo, A. 1991. Giovanni De Lotto (1912-1990). Bollettino del Laboratorio di Entomologia Agr "Fil Sil" 48:245-251.

Brief biography and obituary of the eminent scale taxonomist; includes his list of publications that spans the years between 1947 and 1979.

Bennett, F.D. & Gordon, R.D. 1991. New Florida ladybeetle (Coleoptera: Coccinellidae). Florida Entomologist 74(4):598-599.

This coccinellid (Decadiomus bahamicus) emerged from Bidens pilosa and Chromalaena odorata foliage infested with Orthezia insignis (Homoptera: Ortheziidae); new host record; other hosts include Pseudococcus longispinus, Icerya purchasi, Coccus viridis, Carulaspis minima and Pseudaulacaspis pentagona.

Bergmann, E.C., Stradioto, M.F. & Brisolla, A.D. 1988. Occurrence of Selenaspidus articulatus (Morgan, 1889) on rubber plants (Hevea brasiliensis Muell. Arg.) plantations in Olimpia, Sao Paulo State. (Ocorrencia de Selenaspidus articulatus (Morgan, 1988) em cultura de Seringueira (Hevea brasiliensis Muell. Arg.) no municipio de Olimpia, estado de Sao Paulo.) (Brazil) Biologico 54(1-6):27-28; ill. (In Portuguese, English abstract)

Introduction of this species reported; brief morphological characters described.

Berry, J.A., Morales, C.F., Hill, M.G., Lofroth, B.J. & Allan, D.J. 1989. The incidence of three diaspid scales on kiwifruit in New Zealand. In Proceedings of the Forty Second New Zealand Weed and Pest Control Conference. pp. 182-186.

From a total of 2,630 insects from 13 geographical areas, 72.4% were Hemiberlesia rapax, 27.3% were H. lataniae and 0.4% were Aspidiotus nerii.

Berry, J.A. 1991. Hymenoptera primary types in the New Zealand Arthropod Collection. New Zealand Journal of Zoology 18(3):323-341.

List of Hymenoptera primary types in this collection; includes several for which scale species are hosts, such as Pseudococcus longispinus and Aspidiotus nerii.

Bhagat, R.C., Ramzan, A. & Farhan, N. 1991. New records of scale insects (Homoptera: Coccoidea) and host plants from Kashmir Valley, India. Entomon 16(1):91-94; ill.

18 host plant species of six species of coccids given; 4 species recorded for the first time from Kashmir; biological notes.

Bhardwaj, S.P. 1991. Effect of lower concentrations of miscible oils alone and in combination with insecticides on San Jose scale (Quadraspidiotus perniciosus). Indian Journal of Agricultural Sciences 61(1):73-75.

Chemical control techniques for this species on apple (Malus pumila).

Bielenin, I. & Weglarska, B. 1992. The fine structure of the complex wax gland of female Gossyparia spuria (Mod.) (Homoptera, Coccoidea). (Poland) Zoologische Jahrbuecher, Abteilung fur Anatomie und Ontogenie der Tiere (Zool. Jb. Anat.) 122(3): 417-426; ill.

Secretion of the complex epidermal glands of Gossyparia contains polysaccharides, proteins, and lipids; glycoprotein secretion is due to the central, and largest, cell of the glandular complex; compared to wax glands of

other coccids.

Bielenin, I. & Weglarska, B. 1990. Study of the epidermal glands of female Gossyparia spuria (Mod.), (Coccoidea, Eriococcidae) and SEN morphology of secreted waxes. Zool. Jb. Anat. 120(4):369-379; ill.

Structure and function of the integument glands of this species; main cocoon- forming glands and small cocoon-forming glands have been examined; occurrence of the latter is ascertained for the first time in this species; to elucidate the chemistry of the secretions, they have been histochemically tested for proteins.

Blank, R.H., Olson, M.H. & Gill, G.S.C. 1992. Armoured scale, Hemiberlesia lataniae and H. rapax (Hemiptera: Diaspididae), infestation of kiwifruit rejected for export at two packhouses from 1987 to 1991. New Zealand Journal of Crop and Hort Sci 20:397- 405.

First and second instar were the most common stages, except for the last 3 years at Kerikeri, when mature third instar predominated; mortality of all scale stages generally ranged from 60 to 91%; 56% of infested fruit had a single scale, 15% had no scale, and the remainder had multiple infestations; prevention needed before establishment of first generation scales after fruit set, and second generation scales before harvest.

Blank, R.H., Olson, M.H. & Gill, G.S.C. 1993. An assessment of the quarantine risk of armoured scale (Hemiptera: Diaspididae) fruit infestations on kiwifruit. New Zealand Journal of Crop and Hort Sci 21:139-145.

The nature of infestation of Hemiberlesia lataniae, H. rapax and Actinidia deliciosa on kiwifruit rejected for export from a packhouse; 51% of fruit infested; discussion of percentages of active live mature scale and "acceptable" scale which merely detract from appearance of fruit.

Blank, R.H. & Olson, M.H. 1990. Influence of temperature on toxicity of Diazinon to greedy scale. In Proceedings of the Forty Third New Zealand Weed and Pest Control Conference. Palmerston North, New Zealand: pp. 240-242.

Post treatment temperature effects on the toxicity of Diazinon to 10 day old first instars on kiwifruit Hemiberlesia rapax were investigated using a laboratory dipping technique; low temperatures found to influence the time taken for the full expression of mortality but not the final level achieved.

Blank, R.H. & Olson, M.H. 1989. Lime sulphur for armoured scale and lichen control on kiwifruit. In Proceedings of the Forty Second New Zealand Weed and Pest Control Conference. Palmerston North, New Zealand: (Fruit Crops II.) pp. 191-194.

Dormant season applications of 3.5 and 7% lime sulphur on kiwifruit gave good control of lichen but poor control (<18% kill) of all stages of latania scale (Hemiberlesia latania); lime sulphur treated wood prevented greedy scale (Hemiberlesia rapax) crawler settlement for at least 47 and 85 days after spraying at the 3.5% and 7% rates respectively; recommendations for timing of lime sulphur applications given.

Blank, R.H., Olson, M.H. & Waller, J.E. 1991. Relative efficacy of chemicals for dormant season control of armoured scale on kiwifruit. In Proceedings of the Forty Fourth New Zealand Weed and Pest Control Conference. Palmerston North, New Zealand: (Fruit Crops I.) pp. 75-79.

Thirteen chemical treatments were evaluated for control of over-wintering latania scale (Hemiberlesia lataniae by spraying kiwifruit vines in August 1988 and October 1989; Methidathion, chlorpyrifos, etrimfos and diazinon gave 79-96% control; lime sulphur, azinphos-methyl and phosmet gave 0-50% control; pirimiphos-methyl/ permethrin, half rates of diazinon, and cyanamide gave intermediate levels of control (65-71%).

Blank, R.H. & Olson, M.H. 1989. Toxicity of lime sulphur to armoured scale. In Proceedings of the Forty Second New Zealand Weed and Pest Control Conference. Palmerston North, New Zealand: (Fruit Crops II.) pp. 187-190.

Laboratory dipping technique showed that lime sulphur at the label rate was toxic to immature stages of greedy scale (Hemiberlesia rapax) but only moderately toxic to mature scale; comparisons showed that diazinon was 16 times more toxic to scale than lime sulphur at label rates.

Blank, R.H. & Olson, M.H. 1990. The toxicity of Methidathion against armoured scale pests on kiwifruit. In Proceedings of the Forty Third New Zealand Weed and Pest Control Conference. Palmerston North, New Zealand: pp. 243-246.

Results of this study of Hemiberlesia rapax, H. latania, and Aspidiotus nerii indicate that methidathion gives more effective control than diazinon.

Bloesch, B. & Staubli, A. 1992. The San Jose scale, Quadraspidiotus perniciosus Comst. (Homoptera, Coccoidea). Biology and trapping technique using sex pheromones. (Le pou de San Jose, Quadraspidiotus perniciosus Comst. (Homoptera, Coccidea).) (Switzerland) Revue Suisse de Viticulture, d'Arboriculture et d'horticulture 24(5): 305-310; ill. (In French, English and German abstract)

History of infestations of this species in Switzerland; recorded and quarantined here since 1950's; recently a new outbreak has occurred; map of distribution revealed by trapping.

Blumberg, D. & Goldenberg, S. 1992. Encapsulation of eggs of two species of Encyrtus (Hymenoptera: Encyrtidae) by soft scales (Homoptera: Coccidae) in six parasitoid-host interactions. Israel Journal of Entomology 25-26:57-65.

Encapsulation of eggs by Saissetia coffeae, Protopulvinaria pyriformis, Coccus hesperidum, Parasaissetia nigra, and Pulvinaria urbicola examined; rates of encapsulation compared; effects of superparasitism.

Blumberg, D. & Swirski, E. 1988. Colonization of Metaphycus spp. (Hymenoptera: Encyrtidae) for control of the Mediterranean Black Scale, Saissetia oleae (Olivier) (Homoptera: Coccidae), in Israel. In Citriculture: Proceedings of the Sixth International Citrus Congress: Middle-East, edited by R. Goren and K. Mendel. Tel Aviv: March 6-11, 1988. (Pests and their Management; Integrated Control in Citrus Growth; Postharvest Physiology and Pathology, Vol. 3.) Rehovot, Israel: Balaban; 1209-1213.

Pest of citrus and olives; status of pest in Israel; description of damage; imported parasitoids include Metaphycus helvolus, M. stanleyi, M. swirskii, M. lounsburyi, M. bartletti and M. helvolus.

Braza, R.D. 1989. Falcata rust disease causes insect feeding on galls. (Philippines) Canopy Int. 15(4):8,10; ill.

Damage described; ecology includes presence of Pseudococcus sp.

Braza, R.D. 1990. New records of major insect pests attacking Paraserianthes falcataria in the Philippines. Nitrogen Fixing Tree Research Reports 8:147-148; ill.

One scale insect pest recorded for the first time on P. falcataria in the Philippines (Pseudococcus sp.).

Brink, T. 1989. Five Parasitoids of the White Powdery Scale Found. (Vyf parasitoiede van die witpoeieragtige dopluis gevind.) (South Africa) Information Bulletin, Citrus and Subtropical Fruit Research Institute, South Africa 201:6-7; ill. (In Afrikaans, English abstract)

Cribrolecanium andersoni occurs on citrus in Transvaal, Swaziland and Natal; economically important; secretes honeydew on which sooty mould develops; five primary parasitoids identified.

Brink, T. 1992. Triazophos applications for thrips on citrus also controls the white powdery scale. Inligtsbulletin - navorsing - sinstituut virsitrus en subtropiese vrugte 13(No. 3):18-20; ill.

Population of Cibrolecanium andersoni was studied on Citrus paradisi.

Briolini, G., Domenichini, G. & Cravedi, P. 1988. Integrated peach protection. In Proceedings of the CEC/IOBC/EPPO International Joint Conference on Integrated Crop Protection: from Principles to Practical Implementation. Palais de Congres, Brussels: October 9-11, 1984. (Eur Report, Eur 9386.) Italy: p. 95-103.

Results of this system has succeeded in a 34% reduction in the amount of insecticides needed and, therefore, a 22% reduction in the cost of insecticides and application; Quadraspidiotus perniciosus and Pseudaulacaspis pentagona are the scale insect pests mentioned.

Bullock, R.C. 1989. Split Aldicarb application for pest suppression on navel orange trees in Florida. In Proceedings of the ... Annual Meeting of the Florida State Horticulture Society. Tampa, FL: October 31-November 2, 1989. The Society;

41-44.

Among the pests of citrus that this chemical program attempted to control is Coccus viridis; success related to dosage and timing.

Burts, E. 1992. Pear insecticide evaluations 1991. Insecticide and Acaricide tests Vol. 17:41A, 48.

Pyrus communis spray evaluated for control of various pests including Pseudoccus maritimus and possible damage to fruit.

Burts, E. 1992. Pear soft pesticide test 1991. Insecticide and Acaricide tests Vol. 17:40A.

Pyrus communis spray evaluated for control of various pests including Quadraspidiotus perniciosus and Pseudococcus maritimus and possible damage to fruits.

CAB International Institute of Entomology. 1987. Aclerda takahashii Kuwana. Distribution Maps of Pests Map no. 491:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; hosts include sugarcane.

CAB International Institute of Entomology. 1985. Antonina graminis (Maskell). Distribution Maps of Pests Map no. 216:3 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Rhodes Grass Scale; hosts include Gramineae, especially Chloris gayana.

CAB International Institute of Entomology. 1968. Aonidiella aurantii (Mask.). Distribution Maps of Pests Map no. 2 (rev.):2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name California Red Scale; host plants include Citrus spp., various deciduous fruit trees, wide range of shrubs and flowering plants.

CAB International Institute of Entomology. 1978. Aonidomytilus albus (Ckll.). Distribution Maps of Pests Map no. 81:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Cassava Scale; hosts include Cassava and Solanum spp.

CAB International Institute of Entomology. 1966. Aspidiella hartii (Ckll.). Distribution Maps of Pests Map no. 217:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Yam Scale; hosts include yam, ginger, eddoe, and turmeric.

CAB International Institute of Entomology. 1966. Aspidiotus destructor (Sign.). Distribution Maps of Pests Map no. 218:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common names Coconut, transparent or Bourbon Scale; hosts include coconuts, mango, and banana.

CAB International Institute of Entomology. 1970. Aspidiotus nerii Bch. Distribution Maps of Pests Map no. 268:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (A. hederae); common names Oleander Scale, White Scale and Ivy Scale; polyphagous; hosts include Olive, apple, mango, palms, oleander, and Citrus.

CAB International Institute of Entomology. 1984. Asterolecanium pustulans (Cockerell). Distribution Maps of Pests Map no. 460:3 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Oleander Pit Scale; hosts include apple, cocoa, coffee, cotton, fig, grapevine, oleander and peach.

CAB International Institute of Entomology. 1964. Aulacaspis tegalensis (Zhnt.). Distribution Maps of Pests Map no. 187:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Sugar Cane Scale; hosts include sugarcane.

CAB International Institute of Entomology. 1985. Aulacaspis madiunensis (Zehntner).

Distribution Maps of Pests Map no. 468:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name Stem Shield Scale; hosts include sugarcane.

CAB International Institute of Entomology. 1979. Brevennia rehi (Ldgr.). Distribution Maps of Pests Map no. 401:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy; common name Rice Mealybug; hosts include rice, sugarcane and grasses.

CAB International Institute of Entomology. 1960. Ceroplastes destructor (Newst.). Distribution Maps of Pests Map no. 117:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name White Wax Scale; hosts include Citrus, coffee, and various fruit and shade trees.

CAB International Institute of Entomology. 1977. Ceroplastes rusci (L.). Distribution Maps of Pests Map no. 373:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name Fig Wax Scale; hosts include Ficus, Camellia, Citrus, holly, olive and pistachio.

CAB International Institute of Entomology. 1982. Ceroplastes floridensis (Comst.). Distribution Maps of Pests Map no. 440:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name Florida Wax Scale; hosts include Citrus, guava, mango, fig and tea.

CAB International Institute of Entomology. 1990. Ceroplastes rubens Maskell. Distribution Maps of Pests Map no. 118:3 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name Pink Wax Scale; hosts include Citrus, coffee, tea, Cinnamomum, mango, avocado, and litchi.

CAB International Institute of Entomology. 1951. Chrysomphalus dictyospermi (Morg.). Distribution Maps of Pests Map no. 3:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name Dictyospermum Scale; host plants include Citrus spp., various deciduous fruit trees, wide range of shrubs and palms.

CAB International Institute of Entomology. 1972. Coccus hesperidum (L.). Distribution Maps of Pests Map no. 92 (rev.):2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name Brown Soft Scale; hosts include Citrus spp., other subtropical and tropical fruit trees, tea, and oleander.

CAB International Institute of Entomology. 1972. Coccus viridis (Green). Distribution Maps of Pests Map no. 305:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Lecanium viride); common name Green Coffee Scale; hosts include coffee, tea, guava, cacao, and citrus.

CAB International Institute of Entomology. 1981. Coccus pseudomagnoliarum (Kuw.). Distribution Maps of Pests Map no. 428:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Coccus aegaeus); common name Citricola Scale; hosts include Citrus.

CAB International Institute of Entomology. 1991. Coccus celatus De Lotto. Distribution Maps of Pests Map no. 525:2 pp.; ill. (Series A, Agricultural.)
Family: Coccidae; map showing distribution of this sp. worldwide; countries listed with references to records; host plants include coffee, groundnuts, Citrus, Eugenia javanica and cloves (Syzigium aromaticum).

CAB International Institute of Entomology. 1979. Cryptococcus fagisuga Lndgr. Distribution Maps of Pests Map no. 393:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Cryptococcus fagi); common names Beech Scale and Felted Beech Coccus; hosts include beech.

CAB International Institute of Entomology. 1973. Diaspis bromeliae (Kerner).

Distribution Maps of Pests Map no. 307:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name Pineapple Scale; hosts include pineapple, Agave, Billbergia and Bromelia.

CAB International Institute of Entomology. 1960. Dysmicoccus boninsis (Kuw.). Distribution Maps of Pests Map no. 116:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name Grey Sugar cane Mealybug; hosts include sugar cane and grasses.

CAB International Institute of Entomology. 1972. Dysmicoccus brevipes (Ckll.). Distribution Maps of Pests Map no. 50 (rev.):2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Pseudococcus bromeliae); common name Pineapple Mealybug; host plants include Pineapple, sugar cane, rice, palms, coffee; vector of pineapple wilt and green spot.

CAB International Institute of Entomology. 1966. Ferrisia virgata (Ckll.). Distribution Maps of Pests Map no. 219:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Ferrisiana virgata); polyphagous; hosts include cacao, coffee, citrus, cotton and jute.

CAB International Institute of Entomology. 1971. Geococcus coffeae Green. Distribution Maps of Pests Map no. 285:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name Coffee Root Mealybug; hosts include coffee, cacao, and citrus.

CAB International Institute of Entomology. 1976. Hemiberlesia lataniae (Sign.). Distribution Maps of Pests Map no. 360:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name Latania Scale; hosts include Acacia, almond, avocado, banana, coconut, guava, indigo, mango, rose and tung.

CAB International Institute of Entomology. 1987. Hemiberlesia rapax (Comstock). Distribution Maps of Pests Map no. 484:3 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common names Greedy scale and tropical camellia scale; hosts include camellia and a wide range of fruits.

CAB International Institute of Entomology. 1957. Howardia biclavis (Comst.). Distribution Maps of Pests Map no. 80:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; common name Mining Scale; hosts include Citrus and other tropical and subtropical fruits, coffee and cacao.

CAB International Institute of Entomology. 1955. Icerya seychellarum (Westw.). Distribution Maps of Pests Map no. 52:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; polyphagous.

CAB International Institute of Entomology. 1966. Icerya aegyptiaca (Dgl.). Distribution Maps of Pests Map no. 221:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide (limited to Asia, Africa, Australasia and the Pacific Islands; countries listed with references to records; common name Egyptian Fluted Scale; hosts include citrus, coffee, tea mulberry, and guava.

CAB International Institute of Entomology. 1971. Icerya purchasi (Mask.). Distribution Maps of Pests Map no. 51 (rev.):3 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Pericerya purchasi); common name Cottony Cushion Scale or Fluted Scale; host plants include citrus, mango and guava.

CAB International Institute of Entomology. 1967. Ischnaspis longirostris (Sign.). Distribution Maps of Pests Map no. 235:2 pp.; ill. (Series A, Agricultural.)
Map showing distribution of this sp. worldwide; countries listed with

references to records; common names Black Line Scale and Black Thread Scale; hosts include palms and coffee.

CAB International Institute of Entomology. 1958. Lepidosaphes ulmi (L.). Distribution Maps of Pests Map no. 85:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Oystershell Scale; hosts include deciduous trees and bush fruits, notably apple an pear, ornamental and other trees and shrubs.

CAB International Institute of Entomology. 1982. Lepidosaphes beckii (Newmn.). Distribution Maps of Pests Map no. 49 (rev.):3 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Mytilococcus beckii); common names Citrus Mussel Scale, Purple Scale; host plants include Citrus, olive, fig.

CAB International Institute of Entomology. 1966. Nipaecoccus nipae (Mask.). Distribution Maps of Pests Map no. 220:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; hosts include sweet potato, potato, avocado, coconut, and guava.

CAB International Institute of Entomology. 1957. Orthezia insignis Browne. Distribution Maps of Pests Map no. 73:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; hosts include Citrus, Lantana, eggplant, sweet potato, and rose.

CAB International Institute of Entomology. 1962. Parlatoria blanchardii Targ. Distribution Maps of Pests Map no. 148:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Date Palm Scale; hosts include date palm and other palms.

CAB International Institute of Entomology. 1964. Parlatoria pergandii (Comst.). Distribution Maps of Pests Map no. 185:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Chaff Scale; hosts include Citrus.

CAB International Institute of Entomology. 1964. Parlatoria ziziphus (Lucas). Distribution Maps of Pests Map no. 186:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Black Parlatoria; hosts include Citrus.

CAB International Institute of Entomology. 1979. Parthenolecanium corni (Bch.). Distribution Maps of Pests Map no. 394:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Eulecanium corni); common name Plum Scale; hosts include almond, apple, apricot, cherry;, grape vine, peach, plum, elm and walnut.

CAB International Institute of Entomology. 1979. Parthenolecanium persicae (F.). Distribution Maps of Pests Map no. 395:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Eulecanium persicae); common names Peach Scale and Grapevine Scale; hosts include grape, peach, apple, guava, lemon and quince.

CAB International Institute of Entomology. 1990. Phenacoccus parvus Morrison. Distribution Maps of Pests Map no. 518:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; polyphagous; hosts include Lantana camara, Sida, Solanum melongena, S. tuberosum, Asclepias capsicum, Capsicum frutescens, Ipomoea arborescens, guava, and Labiatae.

CAB International Institute of Entomology. 1967. Pinnaspis buxi (Bch.). Distribution Maps of Pests Map no. 233:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; hosts include coconut and other palms, Buxus and

Pandanus.

CAB International Institute of Entomology. 1959. Planococcus lilacinus (Ckll.). Distribution Maps of Pests Map no. 101:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide (limited to Asia, Africa, Australasia and the Pacific Islands); countries listed with references to records; synonymy (Pseudococcus lilacinus), hosts include cacao, guava, other tropical and sub-tropical fruit and shade trees, Citrus, and coffee.

CAB International Institute of Entomology. 1969. Planococcus citri (Risso). Distribution Maps of Pests Map no. 43 (rev.):3 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy; common names Citrus Mealybug, Coffee Root Mealybug; host plants include Citrus cacao, (a vector of swollen shoot virus), polyphagous.

CAB International Institute of Entomology. 1974. Planococcoides njalensis (Laing). Distribution Maps of Pests Map no. 332:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide (limited to Central and West Africa); countries listed with references to records; synonymy (Lecanium hemisphaerica and Pseudococcus exitiabilis); hosts include cacao, coffee, Ceiba and Cola; main vector of Swollen Shoot virus.

CAB International Institute of Entomology. 1978. Planococcus kenyae (Le Pelley). Distribution Maps of Pests Map no. 384:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Pseudococcus kenyae); hosts include coffee, cacao, Citrus, and sugar cane; vector of swollen-shoot virus.

CAB International Institute of Entomology. 1981. Pseudaonidia trilobitiformis (Green). Distribution Maps of Pests Map no. 418:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Trilobite Scale; hosts include avocado, cacao, citrus coconut, coffee, mango and passion fruit.

CAB International Institute of Entomology. 1980. Pseudococcus maritimus (Ehrh.). Distribution Maps of Pests Map no. 404:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Grape Mealybug; hosts include apricot, Citrus, grapevine, gladiolus, lentils, peach, potato, quince, tea and walnut.

CAB International Institute of Entomology. 1984. Pseudococcus longispinus (Targioni Tozzetti). Distribution Maps of Pests Map no. 93 (rev.):3 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common name Long-tailed Mealybug; polyphagous; hosts include many cultivate plants, especially apple, citrus, cocoa, coconut, coffee, grapevine, fig, pear and ornamental plants such as greenhouse and house plants.

CAB International Institute of Entomology. 1977. Saccharicoccus sacchari (Ckll.). Distribution Maps of Pests Map no. 102 (rev.):2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Trionymus sacchari); common name Pink Sugar cane Mealybug; hosts include sugar cane, rice and sorghum.

CAB International Institute of Entomology. 1973. Saissetia oleae (Ol.). Distribution Maps of Pests Map no. 24 (rev.):2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common names Black Scale, Olive Soft Scale; host plants include Citrus spp., olive, oleander, many subtropical grasses, trees and shrubs.

CAB International Institute of Entomology. 1973. Saissetia coffeae (Wlk.). Distribution Maps of Pests Map no. 318:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Lecanium hemisphaerica); common name Hemispherical Scale; hosts include Citrus, coffee, tea, guava and mango.

CAB International Institute of Entomology. 1981. Selenaspidus articulatus (Morg.). Distribution Maps of Pests Map no. 419:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common names Rufous Scale and West Indian Red Scale; hosts include Citrus, banana, coffee, mango, many fruits and ornamentals.

CAB International Institute of Entomology. 1962. Unaspis citri (Comst.). Distribution Maps of Pests Map no. 149:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; common names Citrus Snow Scale (U.S.) and White Louse Scale (Australia); hosts include Citrus.

CAB International Institute of Entomology. 1970. Unaspis euonymi (Comst.). Distribution Maps of Pests Map no. 269:2 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy (Chionaspis euonymi); common name Euonymus Scale; hosts include Euonymus, Prunus, Hibiscus and ornamentals.

Campbell, C. 1990. Lantana mealybug arrives. Australian Horticulture 88(1):57.

Phenacoccus parvus recorded on lantana in Queensland, Australia; previously known from Central America, West Africa and the Pacific; other hosts include tomato, bean, pepper, chicory and amaranth; brief field description; damage.

Cardosa, A. 1990. Preliminary study of the Coccinellids found on citrus in Portugal. (Estudo previo dos coccinelideos encontrados sobre os citrinos em Portugal.) Bol. Sanid. Veg. Plagas 16(1):105-111. (In Portuguese, Spanish & English abstract)

Various ladybirds investigated in citrus groves for their importance on aphids and coccids; Cryptolaemus montrouzieri and Rodolia cardinalis were most abundant.

Carmean, L. 1988. Integrated pest management in the San Joaquin Valley of California. In Citriculture: Proceedings of the Sixth International Citrus Congress: Middle-East, edited by R. Goren and K. Mendel. Tel Aviv: March 6-11, 1988. (Pests and their Management; Integrated Control in Citrus Growth; Postharvest Physiology and Pathology, Vol. 3.) Rehovot, Israel: Balaban; 1269-1273.

Scale pests of citrus are Aonidiella aurantii, Coccus pseudomagnoliarum and the looming threat of Aonidiella citrina; IPM revolves around conservation of the naturally occurring predatory mite Euseius tularensis against citrus thrips; chemical insecticides applied to control A. aurantii kill predatory mites; other influences include secondary pests, seasonal effects, and pesticide resistance.

1988/89. Cassava mealybug, Phenacoccus manihoti, management by chemical pesticides. (Malawi) Annual Report (Lunyangwa Agricultural Research Station) :41-44.

Four pesticide treatments evaluated; preliminary results indicate the need for another trial; spraying costs discussed.

Ceballos, M. & Hernandez, M. 1988. Signiphora (Chalcidoidea: Signiphoridae) as a hyperparasitoid of Coccophagus sp. in Coccus viridis. (Signiphora (Chalcidoidea: Signiphoridae) como hiperparasito de Coccophagus sp. en Coccus viridis.) (Cuba) Revista de Proteccion Vegetal 3:179-180; ill. (In Spanish, English abstract)

This brief report follows up on an earlier one that claimed Signiphora to be a primary parasite of coccids on citrus; in this report it is shown to be a hyperparasitoid.

Chandra, A., Bhati, D.P.S. & Singh, K.M. 1989. Note on the effect of soil raking and irrigation on survival and hatching of eggs of mango mealy bug, Drosicha Mangiferae Green. (India) Current Agriculture 13(1-2):103-104.

Family: Margarodidae; irrigation raking 4 times (May, June, August and October) controlled egg hatching most successfully in Uttar Pradesh mango orchard.

Chen, X., Wang, S., Mao, Y. & Feng, Y. 1992. On the male aedeagus of four species of lac insects and preliminary cross breeding test. (China) Forest Research 5(2):236- 238; ill. (In Chinese, English abstract)

Results of cross breeding test indicate that Kerria lacca, K. sindica, K. chinensis and K. fici can be alternatively crossed without barrier; crossing

between K. sindica and K. lacca is amphimictic.

Claps, L.E. 1987. Characteristics of the biological cycle of Cornuaspis beckii (Newmann, 1969) and Insulaspis gloverii (Packard, 1869) under insectary conditions (Insecta: Homoptera: Coccoidea: Diaspididae). (Caracteristicas del ciclo biologico de Cornuaspis beckii (Newman, 1869) e Insulaspis gloverii (Packard, 1869) en condiciones de insectario (Insecta: Homoptera: Coccoidea: Diaspididae).) (Argentina) Revista de Investigacion - Centro de Investigaciones para la Regulacion de Poblaciones de Organismos Nocivos 5(1-4):7-16. (In Spanish, English abstract)

Common species which can become pests in orchards; specimens raised on Citrus reshni and C. limon; I. gloverii had six generations and C. beckii had five under the same conditions.

Claps, L.E. 1991. The genus Eudinaspis Lizer & Trelles, 1942 with a description of a new species (Homoptera; Coccoidea; Diaspididae). (El genero Eudinaspis Lizer y Trelles, 1942 con descripcion de una especie nueva (Homoptera; Coccoidea; Diaspididae).) (Argentina) Acta Zoologica Lilloana 40(2):33-37; ill. (In Spanish, English abstract)

Redescription of genus and description of male and female of new species Eudinaspis calchaquensis; hosts; distribution in Argentina.

Clark, M.A., Baumann, L., Munson, M.A., Baumann, P., Campbell, B.C., Duffus, J.E., Osborne, L.S. & Moran, N.A. 1992. The eubacterial endosymbionts of whiteflies (Homoptera, Aleyrodoidea) constitute a lineage distinct from the endosymbionts of aphids and mealybugs. Current Microbiology 25(2):119-123.

Sequence analysis of the genes for the 16S rRNA of endosymbionts of Bemisia tabaci, Siphoninus philyreae and Trialeurodes vaporariorum indicates that these organisms are closely related and constitute a distinct lineage within the τ-subdivision of the Proteobacteria.

Clarke, S.R., DeBarr, G.L. & Liu, T. 1992. Contact toxicities of five pyrethroid and four organophosphorous insecticides to Toumeyella parvicornis (Cockerell) crawlers. Canadian Entomologist 124(3):563-564.

The use of pyrethroids in southern pine seed orchards to control seed and cone insects sometimes results in outbreaks of scale insects; infestations have been partly related to the relatively low contact toxicities of pyrethroids, lower than organophosphorous insecticides against crawlers of the striped pine scale, Toumeyella pini; the objective of this study was to determine if a similar relationship exists for the pine tortoise scale, Toumeyella parvicornis, another pest that infests southern pine seed orchards; results indicated that pyrethroids in general were less toxic than organophosphorous insecticides to T. parvicornis.

Cobb, P.P. 1991. Controlling mealybugs on ornamentals. Circular ANR (Alabama Cooperative Extension Service, Auburn University) (190):2 pp.

Brief field description and life history; damage; host plants include coleus, fern, begonia and geraniums; control measures.

Cooper, D.J. & Zhang, Q.Y. 1992. Note: Virus-like particles in the Pink Sugarcane mealybug, Saccharicoccus sacchari. (Australia) Journal of Invertebrate Pathology 60: 206-207; ill.

Report of observations of the occurrence of pathogens within field-collected and glasshouse-reared specimens; insects showed no signs of disease.

Cooper, D.J. & Zhang, Q.Y. 1992. Virus-like particles in the pink sugarcane mealybug, Saccharicoccus sacchari. (Australia) Journal of Invertebrate Pathology 60:206-207; ill.

Cosmopolitan pest of sugarcane, Saccharum officinarum, occurring in every sugarcane-producing country of the world; in New South Wales and Queensland in Australia; economically important due to its sap-feeding habit and copious excretion of honeydew; first report of the occurrence of VLPs (virus-like particles) in Pseudococcidae.

Couturier, G., Matile-Ferrero, D. & Richard, C. 1985. Scales from the Tai region (Ivory Coast) recorded on agricultural crops and in dense forests. (Sur les

cochenilles de la region de Tai (Cote d'Ivoire), recensees dans les cultures et en foret dense (Homoptera, Coccoidea).) Revue fr. Ent. (N.S.) 7(5):273-286; ill. (In French, English abstract)

52 species from 6 families listed; alphabetical list of hosts with coccid fauna; ecological data such as type of biotype, location on plant and ant association; 27 species (19 afrotropical) new for Ivory Coast; 8 species recorded for the first time; Dysmicoccus boninsis and Kuwanaspis vermiformis new for tropical Africa.

Cowley, J.M., Chadfield, K.D. & Baker, R.T. 1992. Evaluation of dry heat as a postharvest disinfestation treatment for persimmons. In Australasian Postharvest Conference. 1991. New Zealand Journal of Crop and Hort Sci; 209-215.

Dry heat is proposed as a non-chemical postharvest disinfestation treatment for pests of export persimmons (Diospyros kaki); efficacy of this treatment was tested on several insect pests including Pseudococcus longispinus; 100% mortality achieved.

Cox, J.M. 1989. The mealybug genus Planococcus (Homoptera: Pseudococcidae). (Great Britain) Bull. Br. Mus. nat. Hist. (Ent.) 58(1):1-78; ill.

Key to 35 species; descriptions; synonymy; eight new synonymies proposed; distributions; hosts; economic status; comparisons; nine newly described species; three species of Crisiccocus illustrated to clarify similarities with species of Planococcus.

Crause, C. 1989. Parasitoids of the white scale. (Parasiete van die witperskedopluis.) (South Africa) Information Bulletin, Citrus and Subtropical Fruit Research Institute, South Africa 202:12. (In Afrikaans)

Aspidiotiphagus sp. (Encarsia sp.) and a species of Arrhenophagus similar to A. chionaspidis are reported from the Diaspidid Pseudaulacaspis pentagona.

Cross, A.E. & Moore, D. 1992. Development studies on Anagyrus mangicola (Hymenoptera: Encyrtidae), a parasitoid of the mealybug Rastrococcus invadens (Homoptera: Pseudococcidae). (Great Britain) Bulletin of Entomological Research 82:307-312.

Data given on nymphal stages, morphology and duration of immature development; sex ratios of emerging parasitoids, adult longevity, host stage preference, relationship of the size of the emerging parasitoid to host stage and development time also investigated.

Cudjoe, A.R., Neuenschwander, P. & Copland, M.J.W. 1992. Experimental determination of the efficiency of indigenous and exotic natural enemies of the cassava mealybug, Phenacoccus manihoti Mat.-Ferr. (Hom., Pseudococcidae), in Ghana. (Ghana) Journal of Applied Entomology 114:77-82. (In English, German abstract)

Effectiveness of Epidinocarsis lopezi and Exochomus troberti in reducing populations of Phenacoccus manihoti studied; E. lopezi more effective.

Curtis, C.E., Clark, J.D., Tebbets, J.S. & Mackey, B.E. 1992. Incidence of arthropods found in packed nectarine fruit in Central California. Southwestern Entomologist 17(1):29-39.

18,000 fruit of each of six cultivars of Prunus persica sampled yearly for 3 years; 23 species representing 2 classes, 11 orders and 16 families of insects, mites, and spiders were found; pests of economic significance were represented by 7 lepidopterous species, 5 species of Homoptera, and 1 species each of 5 other orders; 4 scales and mealybugs identified; among the species with highest incidence are Quadraspidiotus juglandsregiae and Q. perniciosus.

Cywin, C.L. & Kallmerten, J. 1991. Enantioselective synthesis of a sex attractant pheromone of the pine scale Matsucoccus feytaudi. Journal of Natural Products 54(6): 1664-1667.

Description of (--)-(2E,4E,6R,10S)-4,6,10-trimethyl-2,4-dodecadien-7-one[2], a primary sex attractant pheromone of this scale species.

Daane, K.M. & Caltagirone, L.E. 1990. Monitoring black scale in California olive orchards. Acta Horticulturae 286:347-350.

Saissetia oleae is an explosive and unpredictable pest of olives in California; cultural practices (e.g. irrigation) and summer weather influence scale biology; canopy structure has the most influence on scale distribution and mortality.

Dalby, J. 1992. Biological pest control in protected cropping. New Farmer & Grower 35:15-16; ill.

Discusses the use of Encarsia formosa and Verticillium lecanii for the control of Trialeurodes vaporiorum on greenhouse crops such as tomatoes and cucumbers; E. formosa is available from suppliers in the form of black scales.

Das, S.C., Borthakur, M. & Gope, B. 1988. Bio-ecological studies on Chilocorus circumdatus Sch. an efficient predator of Black Scale, Chrysomphalus aonidium (=C. ficus) Ashm. (India) Two and a Bud 35(1-2):15-18; ill.

Biological agent to control Black Scale of tea discussed; other natural enemies listed.

Davidson, I.R. 1992. Regent honeyeaters feeding on mealy bug honeydew. Australian Bird Watcher 14(5):193-194.

Feeding behavior and ecology of Xanthomyza phrygia, Regent Honeyeater, described; found feeding on Pseudococcidae honeydew under bark of Eucalyptus goniocalyx.

de Beer, H. 1991. Jacaranda wax scale. (South Africa) Plant Protection News (23):7; ill.

Gascardia sinoiae, a native species, leaves a white waxy layer on Jacaranda trees but poses no threat to their health; kept under control by several indigenous species of parasitoids; has been mistaken for Dactylopius spp.

De Villiers, E.A. 1990. Mass rearing of the mango scale, Aulacaspis tubercularis Newstead (Hemiptera: Diaspididae). (Massateling van die mangodopluis, Aulacaspis tubercularis Newstead (Hemiptera: Diaspididae).) (South Africa) Navorsingsinstitiit vir Sitrus Subtropiese Vrugte 11(10):17-19; ill. (In Afrikaans, English abstract)

Important pest on mango in South Africa; causes superficial lesions on skin; technique described for raising this species on Cucurbita moschata.

Dejean, A. & Turillazzi, S. 1992. Territoriality during trophobiosis between wasps and homopterans. (Cameroon) Tropical Zoology 5(2):237-247; ill.

Among the wasps observed is Ropalidia guttatipennis and Polybioides tabida tending Inglisia conchiformis Newstead; discussion of division of tasks such as guards and honeydew harvesters; competition with Myrmicaria ants.

Delinska, N. 1989. A method of determining commencement of hatching of nymphs of San Jose scale Quadraspidiotus perniciosus. (Bulgaria) Rausteniev'dni Nauki (Plant Science) 26(3):102-105. (In Russian, English abstract)

Simpler and more accurate prediction of birth of nymphs proposed in order to facilitate biological control.

Dentener, P.R.e.a. 1992. Modified atmospheres for the postharvest disinfestation of New Zealand persimmons. In Australasian Postharvest Conference. 1991. New Zealand Journal of Crop and Hort Sci; 203-208.

Diospyros kaki exported to Japan are fumigated with methyl bromide or hydrogen cyanide when live insects such as Pseudococcus longispinus, are intercepted on arrival; fumigation damages this persimmon cultivar and reduces its marketability; this paper describes an alternative disinfestation treatment.

Devasahayam, S. 1992. Insect pests of black pepper and their control. (India) Planters Chronicle 155:153.

The biology of the six main insect pests of Piper nigrum in India, including Lepidosaphes piperis and Aspidiotus destructor.

Devnath, S. 1986. A new scale insect Asterolecanium pustulans (Asterolecaniidae: Coccoidea) recorded on tea in Darjeeling. (India) Two and a Bud 33(1-2):27-28; ill.

Recorded on Camellia sinensis for the first time, in Darjeeling; damage described; associated with fungus Aschersonia sp.

Dhileepan, K. 1992. Insect pests of oil palm (Elaeis guineensis) in India. (India) Planter 68:193-191; ill.

Previous to this study 54 species of insects have been identified as pests of oil palm; 12 additions found to this list including six scale species; nature

of damage; distribution in India.

Dhileepan, K. 1991. Insects associated with oil palm in India. (India) FAO Plant Protection Bulletin 39(2/3):94-99. (In English, French & Spanish abstract)

54 species of insects identified by this survey; 6 scale insects were associated with oil palm nurseries and 20 with field palms; Hemiberlesia lataniae, Chrysomphalus aonidum, Pinnapsis (Pinnaspis?) aspidistrae and Dysmicoccus brevipes were classified as potential pests.

Dhingra, S. 1990. Alternative insecticides for the control of mango mealy bug Drosicha mangiferae Green to overcome the failure of usually available insecticides. (India) Journal of Entomological Research (New Delhi) 14(2):139-141.

Toxicity of 10 insecticides evaluated; methyl parathion offered the most promise for successful control.

Dinesh, D.S. 1991. Observations on Aneristus ceroplastae Howard (Hymenoptera: Aphelinidae) a parasitoid of mango scale, Chloropulvinaria polygonata (Homoptera: Coccidae). (India) Entomon 16(2):155-157.

Percentage of parasitization of various stages of this scale species reported.

Drummond, J., De Barro, P.J. & Pinnock, D.E. 1991. Field and laboratory studies on the fungus Aspergillus parasiticus, a pathogen of the pink sugar cane mealybug Saccharicoccus sacchari. (Australia) Biological Control 1(4):288-292.

Infestation of sugar cane nodes by S. sacchari was studied in two commercial fields over a 7-month period; natural enemies include Aspergillus parasiticus, Metarhizium anisopliae, Penicillium spp., Cacoxenus perspicax and Anagyrus saccharicola.

Dutta, S.K. & Devaiah, M.C. 1987. Morphology of the crawler of Sugarcane Scale Insect, Melanaspis glomerata (Green) (Diaspididae: Homoptera). (India) Journal of Research Assam Agriculture University 8(1-2):30-35; ill.

Synonymy; detailed description.

Dutta, S.K. & Devaiah, M.C. 1987. Preliminary observations on parasitic habit of Azotus sp. (Aphelinidae: Hymenoptera). (India) Journal of Research Assam Agriculture University 8(1-2):54-56; ill.

Azotus sp. parasitized the fourth instar larva of Anabrolepis mayurae, a primary parasite of the sugarcane scale insect, Melanaspis glomerata; larval development of Azotus sp. arrested in the first instar due to encapsulation by the host.

Dziedzicka, A. 1990. The characteristic of scale insects (Coccinea) occurring in Polish greenhouses. Part III. Pseudococcidae. Acta Biologica Cracoviensia; Series: Zoologia 32:29-38; ill.

Descriptions of 5 species of Pseudococcidae: Pseudococcus longispinus, P. maritimus, Planococcus citri, Nipaecoccus nipae and Rhizoecus cacticans; biological notes; hosts; damage; distribution within Poland.

Dziedzicka, A. 1990. The characteristic of scale insects (Coccinea) occurring in Polish greenhouses. Part II. Coccidae. Acta Biologica Cracoviensia; Series: Zoologia 32:2-27; ill.

Descriptions of 5 species of Coccidae previously reported in Poland: Saissetia coffeae, S. oleae, S. nigra, Coccus hesperidum, and Eucalymnatus tesselatus; Ceroplastes rusci and Chloropulvinaria floccifera have been reported previously in Poland but were not found during this survey; one species is described from the Asterolecaniidae family: Asterolecanium epidendri; biological notes; hosts; damage; distribution within Poland.

Dziedzicka, A. 1988. Contribution to the studies on scale insects (Homoptera, Coccinea) in Poland. (Przyczynek do badan nad czerwcami (Homoptera, Coccinea) Polski.) Zeszyty Problemowe Postepow Nauk Rolniczych 353:93-100. (In Polish, English abstract)

Notes on 37 scale species; many collected from new host plants.

Dziedzicka, A. 1988. Glass-house mealybugs (Homoptera, Coccinea, Pseudococcidae). (Welnowce szklarniowe (Homoptera, Coccinea, Pseudococcidae).) Zeszyty Problemowe Postepow Nauk Rolniczych 353:87-92. (In Polish, English abstract)

5 species described: Pseudococcus longispinus, P. maritimus, Planococcus

citri, Nipaecoccus nipae and Rhizoecus cacticans; hosts; damage.

Dziedzicka, A. & Karnkowski, W. 1990. The contribution to knowledge of Selenaspidus articulatus (Morgan) (Homoptera, Coccinea, Diaspididae). (Poland) Acta Biologica Cracoviensia; Series: Zoologia 32:39-43; ill.

Recent imports of citrus from Cuba are infested with this species; description; synonymy; lives on leaves and occasionally on fruits; distributed in Asia, Central and South America, and Australia; in greenhouses in Europe; other hosts include Coffea, Ficus, Jasminum, Gardenia, Ligustrum, Magnolia, Mangifera, Olea, Pandanus, Sambucus, Tilia and various species of palm trees; in Poland it has been found on Chrysomphalus dictyospermi, Diaspis boisduvalii, Hemiberlesia rapax, Howardia biclavis, Lepidosaphes beckii, L. gloveri, Parlatoria pergandii, P. proteus, Pinnaspis aspidistrae, P. strachani, Aonidiella aurantii and Selenaspidus articulatus.

Eisa, A.A., El-Fatah, M.A., El-Nabawi, A. & El-Dash, A.A. 1991. Insect growth regulators as agents to control the Florida wax scale, Ceroplastes floridensis Comst. (Hom., Coccidae). Anzeiger fur Schadlingskunde, Pflanzenschutz, Umweltschutz 64(1): 16-18; ill. (In English, German abstract)

Damaging to citrus in Egypt; most of the common insecticides used to control scales are non selective, disturb the biological balance and cause outbreaks of nontarget pests; 5 insect growth regulators evaluated; treatment found to be successful in preventing scale maturity and oviposition.

El-Kareim, A.I.A. & Shanab, L.M. 1992. Host-seeking stimulants (kairomones) for parasitoids of purple scale insects. In International Symposium on Integrated Plant Protection in Orchards (ISIPPO). Hungary: July 31-August 5, 1990. Acta Phytopathologica et Entomologica Hungarica; 29-34.

Chemical stimuli (kairomones) produced by the host females, Lepidosaphes beckii, play a role in host recognition and discrimination by the ectoparasitoid Aphytis lepidosaphes; kairomone extraction of L. beckii female bodies lost its biological activity after 72 h; A. lepidosaphes females gave positive response to the site of L. beckii bodies on orange leaves which recently had been removed; the time required by the parasitoid to reach the site of the kairomones was shorter at higher kairomone concentrations.

English, L.L. 1990. Camellia pests. In American Camellia Yearbook. Blair, A. B., Ed. Fort Valley, GA: American Camellia Society. pp. 1-8.

Seven scale insects discussed; their importance and extent of damage to camellias; biology; control measures.

Erichsen, C., Samways, M.J. & Hattingh, V. 1991. Reaction of the ladybird Chilocorus nigritus (F.) (Col., Coccinellidae) to a doomed food resource. (South Africa) Journal of Applied Entomology 112:493-498. (In English, German abstract)

Economically important natural enemy of red scale (Aonidiella aurantii (Maskell)) in citrus growing regions of southern Africa; Aspidiotus nerii used to rear this Coccinellid.

1992. Euonymus Scale Biological Control Project Manual. U.S. Department of Agriculture, Animal and Plant Health Inspection Service. Plant Protection and Quarantine. Biological Control Operations.: [144 pp.]; ill.

Loose-leaf binder contains guide for project participants doing surveys of Unaspis euonymi density, natural enemies, degree of infestation, and maintenance and use of insectaries; this species' host ranks among the top most common ornamental plants used for landscaping; natural enemies include Cybocephalus nipponicus and Chilocorus kuwanae.

Fasih, M. & Srivastava, R.P. 1990. Parasites and predators of insect pests of mango. (India) International Pest Control 32(2):39-41.

Among the natural enemies found are Cryptochetum on Drosicha mangiferae and Coccodiplosis on Rastrococcus iceryoides; chemical control measures recommended.

Fernandes, I.M. 1990. Contribution to the knowledge of Coccoidea (Homoptera) of Portugal. 1 - Annotated list of Cochineals of the garden of the Zoology Center. (Contribuicao para o conhecimento de Coccoidea (Homoptera) de Portugal. 1 -Lista anotada de cochonilhas do jardim do centro de zoologia.) (Portugal) Garcia de

Orta, Ser. Zool. 17(1-2):59-63. (In Portuguese, English & French abstract)
17 species from 4 families identified; host plants; notes.

Fernandes, I.M. 1988 (1990). On the presence of Ceroplastodes Zavattarii Bellio, 1939 (Homoptera: Coccidae) in Guine-Bissau. (Sobre a presenca de Ceroplastodes Zavattarii Bellio, 1939 (Homoptera, Coccidae) na Guine-Bissau.) (Portugal) Garcia de Orta, Ser. Zool. 15(2):175-177. (In Portuguese, English abstract)
Description; morphology; distribution; hosts.

Fernandez, M. 1987. Morphology of Aspidiotiphagus sp. (Hymenoptera: Aphelinidae). (Morfologia de Aspidiotiphagus sp. (Hymenoptera: Aphelinidae).) (Cuba) Revista de Proteccion Vegetal 2(2):134-139; ill. (In Spanish, English abstract)
This aphelinid is natural enemy of Unaspis citri, white scale of citrus; this paper describes developmental phases of the wasp; includes key.

Focarile, A. 1991. Arctorthezia cataphracta (Olafsen, 1772): a new boreo-orophilous species for Ticino (Homoptera; Coccoidea; Ortheziidae). (Arctorthezia cataphracta (Olafsen, 1772); una cocciniglia boreo-orofila nuova per il Ticino (Homoptera Coccoidea Ortheziidae).) (Italy) Bollettino della Societa Ticinese di Scienze Naturali 79(1):39-43; ill. (In Italian, English abstract)
Description; distribution in Italy; altitudes; hosts include Carex firma, Calluna vulgaris, Rhododendron ferrugineum, Vaccinium myrtillus, Dryas octopetala, Saxifraga oppositifolia, S. cuneifolia, S. aizoon and Chrysanthemum alpinum.

Fontenla Rizo, J.L. 1990. Coexistence relationships among six species of Coccoidea (Insecta: Homoptera) in a diverse citrus environment. (Relaciones de coexistencia de seis especies de Coccoidea (Insecta: Homoptera) en un policultivar de citricos.) (Cuba) Poeyana (Academia de Ciencias de Cuba) (391):1-23. (In Spanish, English abstract)
One theory suggests that crop system and varietal diversity tend to decrease pest abundance; ecomorphology is important to determine resource utilization and partitioning.

Gerson, U. 1992. Perspectives of non-phytoseiid predators for the biological control of plant pests. Experimental and Applied Acarology 14(3-4):383-391.
A dozen families have potentially important non-phytoseiid predators of plant pests; effect of host plant; antipredator mechanisms; interactions between predators; effects of pesticides; current work with Hemisarcoptes; recommendations for further study.

Ghani-Ibrahim, A. 1990. Effects of foliar applications of selected insecticides on cocoa pests and pollinators. (Malaysia) Pertanika 13(3):361-366.
Cocoa plants sprayed with insecticides such as Gamma HCH, methamidophos and cypermethrin using mistblowers at weekly intervals for 20 consecutive weeks produced high number of cocoa flowers but the percentage of effective pollination was not significantly different from the control; the mealybug Cataenococcus spp. mentioned as minor insect pest on Theobroma cocoa.

Ghose, S.K. & Ghosh, A.B. 1990. Morphology of different instars of some mealybugs (Pseudococcidae, Homoptera). (India) Environment & Ecology 8(1):137-142.
Morphology and functions of females and males of seven species discussed: Maconellicoccus hirsutus, Coccidohytrix insolita, Ferrisia virgata, Dysmicoccus brevipes, Rastrococcus iceryoides, Planococcoides bengalensis, Novonilacoccus oryzae and Nipaecoccus viridis; keys to first instar nymphs and two preadult and adult females provided.

Gill, R.J. 1993. The Scale Insects of California : Part 2. The Minor Families (Homoptera : Coccoidea): Margarodidae, Ortheziidae, Kerridae, Asterolecaniidae, Lecanodiaspididae, Cerococcidae, Aclerdidae, Kermesidae, Dactylopiidae, Eriococcidae, and Phoenicococcidae. Sacramento, CA: California Dept. of Food & Agriculture. 241 pp. [119 figs., and 108 plates in color]. (Technical Series in Agricultural Biosystematics & Plant Pathology, No. 2.) [Second of planned 5-volume set covering Coccoidea & whiteflies of California.]
Intended as field guide and laboratory manual; all California minor scale spp. listed; field characteristics; spp. which are similar; keys; common hosts, distribution; biology; economic importance; biological control.

Goergen, G. & Neuenschwander, P. 1992. A cage experiment with four trophic levels: cassava plant growth as influenced by cassava mealybug, Phenacoccus manihoti, its parasitoid Epidinocarsis lopezi, and the hyperparasitoids Prochiloneurus insolitus and Chartocerus hyalipennis. Zeitschrift fur Pflanzenkrankheiten und Pflanzenschutz 99(2):182-190. (In English, German abstract)

Cassava mealybug was applied at two initial infestation densities to cassava, some of which was grown at different fertilizer levels; some cages received E. lopezi, the CM specific parasitoid, and/or the hyperparasitoids P. insolitus and C. hyalipenis; plant survival and dry matter production were used to assess the hyperparasitoid's effect via the food chain; all plants infested with CM alone died; adding either of the hyperparasitoids did not significantly reduce E. lopezi's efficiency in preventing damage; generally mild impact of hyperparasitoids confirms results in the field.

Gonzalez, C. & Hernandez, D. 1988. The Lepidosaphes genus (Homoptera: Diaspididae) on citrus in Cuba. (El genero Lepidosaphes (Homoptera: Diaspididae) sobre citricos en Cuba.) Ciencia y Tecnica en la Agricultura, Citricos y Otros Frutales 11(1):7-46. (In Spanish, English abstract)

Bibliographic review on this genus; Cornuaspis beckii and Insulaspis gloverii described; natural enemies.

Gonzalez, R.H. 1991. Mealybugs (Homoptera: Pseudococcidae), a new pest of Japanese plums in Chile. (Chanchitos blancos (Homoptera: Pseudococcidae), una nueva plaga de ciruelos en Chile.) Revista Fruticola 12(1):3-7; ill. (In Spanish, English abstract)

Review of several species of mealybugs observed on stone fruit including Pseudococcus affinis, P. maritimus, P. longispinus, P. calceolariae and Planococcus citri; hosts; damage; control methods.

Gordon, R.D. & Hilburn, D.J. 1990. The Coccinellidae (Coleoptera) of Bermuda. (Bermuda) Journal of the New York Entomological Society 98(3):265-309; ill.

Covers 14 species of Coccinellidae occurring on Bermuda; distributions; immature stages; keys for the identification of adults and larvae; scale hosts mentioned.

Granara de Willink, M.C. 1991. Economically important mealybugs found in Argentina: recent species and new list of hosts. (Cochinillas harinosas de importancia economica encontradas en la Argentina: actualizacion sistematica y nueva lista de hospederos.) Boletin de la Academia Nacional de Ciencias (Cordoba, Argentina) 59(3/4):259-271. (In Spanish, English abstract)

12 mealybugs of agricultural interest are discussed: Dismicoccus brevipes, Ferrisia virgata, Planococcus citri, P. ficus, Pseudococcus affinis, P. comstocki, P. longispinus, P. maritimus and Saccharicoccus sacchari with Antonina graminis, Dysmicoccus boninsis and Planococcus minor being new records for Argentina; host list includes 89 plant species in 43 families; 62 hosts are new records for Argentina.

Granara de Willink, M.C. 1991. A new species of Ferrisia Fullaway in the Argentine republic (Homoptera: Pseudococcidae). (Una nueva especie de Ferrisia Fullaway en la Republica Argentina (Homoptera: Pseudococcidae).) (Argentina) Insecta Mundi 5(3-4): 181-184; ill. (In Spanish, English abstract)

Ferrisia multiformis, new sp., is described on Parthenium sp.; key provided to separate it from F. virgata and F. meridionalis, other Argentine species.

Gravena, S., Fernandes, C.D., Santos, A.C., Pinto, A.S. & Paiva, P.S.B. 1992. Effect of Buprofezin and Abamectin on Pentilia egena (Muls.) (Coleoptera: Coccinellidae) and Chrysopids on Citrus. (Efeito de Buprofezin e Abamectin sobre Pentilia egena (Muls.) (Coleoptera: Coccinellidae) e crispideos em citros.) (Brazil) Anais da Sociedade Entomologica do Brasil 2131(215-222)(In Portuguese, English abstract)

This treatment studied in comparison to sulfur and adults, and sulfur and mineral oil in citrus attacked by Selenaspidus articulatus (Morgan) (Hemiptera: Diaspididae); low to moderate effect observed on predators.

Greaves, A.J., Tomkins, A.R., Wilson, D.J. & Thomson, C. 1992. Abamectin to control armoured scales (Hemiptera: Diaspididae) on kiwifruit. New Zealand Journal of

Crop and Hort Sci 20:79-83.

Abamectin applied to previously unsprayed Actinidia deliciosa vines to control Hemiberlesia rapax and Aspidiotus nerii; results showed 16 scale/100 fruit for treated vines compared to 102 scale/100 fruit for untreated vines.

Grout, T.G. & Richards, G.I. 1991. Effect of Buprofezin applications at different phenological times on California Red Scale (Homoptera: Diaspididae). (South Africa) Journal of Economic Entomology 84(6):1802-1805.

California red scale; important citrus pest in southern Africa; treatments applied at crawler emergence and midway between two peaks of crawler emergence in populations with either two or three cohorts; crawler emergence treatments significantly more efficacious in inter-emergence treatments only in dual-cohort populations during winter when the intercohort periods were longest.

Grout, T.G. & Richards, G.I. 1992. Organophosphate resistance in California red scale (Homoptera: Diaspididae) on citrus in the eastern Cape and the effect of oil as an organophosphate synergist. (South Africa) Journal of the Entomological Society of Southern Africa 55(1):1-7.

A bio-assay comparing the efficacies of chlorpyrifos, methidathion, prothiofos, parathion and phenthoate at 0,053 of their field dosages was conducted using resistant red scale crawlers; results showed that the crawlers were resistant to all these organophosphates as had been found previously in the Transvaal.

Gu, D. & Murakami, Y. 1990. Ecological studies on the pine needle Hemiberlesian scale, Hemiberlesia pitysophila Takagi (Homoptera: Diaspididae) and its parasitoid Coccobius azumai Tachikawa (Hymenoptera: Aphelinidae). Science Bulletin Faculty Agric. Kyushu Univ. 45(1-2):31-36. (In Japanese, English abstract)

This scale species is an important pest of pine trees; Oriental distribution; accidentally introduced into China in mid 1980's; biological and behavioral characteristics of parasitoid studied.

Guerrieri, E. & Viggiani, G. 1990 (1992). The genera of Encyrtidae (Hymenoptera: Chalcidoidea) parasitoids of Kermesidae (Homoptera: Coccoidea) with the description of Psilophrys parvulus, new sp. (Sui generi di encyrtidae (Hymenoptera: Chalcidoidea) parassitoidi di kermesidae (Homoptera: Coccoidea) con descrizione di Psilophrys parvulus sp. n.) Bollettino del Laboratorio di Entomologia Agr "Fil Sil" 47(139-150; ill.)(In Italian, English abstract)

Key to 8 genera of Encrytidae proposed; brief review of each.

Gullan, P.J., Buckley, R.C. & Ward, P.S. 1993. Ant-tended scale insects (Hemiptera: Coccidae: Myzolecanium) within lowland rain forest trees in Papua New Guinea. Journal of Tropical Ecology 9(1):81-91; ill.

Eight species of Myzolecanium are reported from ant nests in stem cavities; attendant ants belonged to six species in three genera and two subfamilies; host plants belonged to at least five families; characteristics of Myzolecanium-ant association, role of the coccids as trophobionts, and the nature of the plant associations are discussed; new combinations proposed by Gullan for three species previously placed in Cryptostigma: M. endoeucalyptus, M. magnetinsulae and M. robertsi.

Gupta, B.P. & Singh, Y.P. 1988. Mango scale insects -- occurrence in western Uttar Pradesh and their control. (India) Progressive Horticulture 20(3-4):357-361.

Aspidiotus destructor, Aonidiella inornata and Pulvinaria polygonata observed infesting mango trees; survey showed A. inornata most common; 15 insecticides evaluated.

Hamon, A.B. 1992. The cottonycushion scale, Icerya purchasi, in Florida (Homoptera: Margarodidae). Entomology Circular (Fla. Dept. Agric. & Consumer Serv.) (No. 352):2 pp.; ill.

Discussion of this species' accidental introduction into Florida with a shipment of Rodolia cardinalis for biological control of other scale species; brief field description of females and rare males; most common hosts are Citrus spp. and Pittosporum spp. in Florida; worldwide distribution on Citrus.

Hanks, L.M. & Denno, R.F. 1993. The white peach scale, Pseudaulacaspis pentagona (Targioni-Tozzetti) (Homoptera: Diaspididae): life history in Maryland, host

plants, and natural enemies. Proceedings of the Entomological Society of Washington 95(1):79- 98.

Severe pest of woody ornamentals and fruit trees throughout the world; life history; hosts from about 100 genera from 55 families listed; list of 64 natural enemies; population biology.

Hansen, J.D., Hara, A.H. & Tenbrink, V.L. 1992. Vapor heat: a potential treatment to disinfest tropical cut flowers and foliage. HortScience 27(2):139-143.

Treatment tested for efficacy against Hawaiian quarantine pests including six scale species; flowers that could withstand treatment and those that were adversely affected are listed.

Hanson, P. 1991. Parasitoids associated with coffee in Costa Rica. (Los parasitoides asociados al cafeto en Costa Rica.) Manejo Integrado de Plagas (20-21):8-10. (In Spanish, English abstract)

A modified sweep net was used to sample the Hymenopteran parasitoids associated with coffee; of 80 species collected, 4 species of Encyrtidae are associated with mealybugs, and 4 species with soft scale; indirect evidence provided for the existence of natural biological control of these potential pests.

Hashem, M., Helal, E., El-Gayar, F. & Farah, E.E.M. 1987. Some biological studies on the Beetle mite Oribatula sp. (Acarina: Oribatulidae). Alexandria Journal of Agricultural Research 32(3):369-377. (In English, Armenian abstract)

Favorite food for this mite is crawlers of the Florida wax scale, Ceroplastes floridensis.

Hassan, S.M. 1991. The two lac insects of South Indian (sic); a wild and a cultivated species, Part I. (India) Pakistan Journal of Scientific and Industrial Res 34(2-3): 95-96; ill.

Kerria communis and K. mysorensis discussed; lac production leads to the commercial production of shellac; hosts.

Hatakoshi, M., Shono, Y., Yamamoto, H. & Hirano, M. 1991. Effects of the juvenile hormone analog Pyriproxyfen on Myzus persicae and Unaspis yanonensis. (Japan) Applied Entomology and Zoology 26(3):412-414.

Evaluation of this substance for sterilization potential in field experiments; results indicate that pyriproxyfen seems to be able to penetrate the wax layer of the scale and induce lethal and/or sterilizing effects at every adult stage.

Hattingh, V. & Samways, M.J. 1991. A forced change in prey type during field introductions of Coccidophagous biocontrol agents Chilocorus species (Coleoptera Coccinellidae); is it an important consideration in achieving establishment? In Behaviour and Impact of Aphidophaga, edited by L. Polgar, R. J. Chambers, A. F. G. ,. and Hodek, I. Dixon & Eds. Godollo, Hungary: September 1990. Hague, the Netherlands: SPB Academic Publishing; pp. 143-148.

In southern Africa, C. nigritus is a valuable biocontrol agent of red scale Aonidiella aurantii (Diaspididae) on citrus; Asterolecanium sp. on Dendrocalamus giganteus is an important alternative prey for C. nigritus in the field; C. bipustulatus is a new biocontrol agent for red scale in southern Africa targeted for regions in which C. nigritus has not been established; insectary cultures of the beetles are maintained on Aspidiotus nerii and released onto red scale and Asterolecanium sp. during field introductions aimed at establishment in new areas.

Hattingh, V. & Samways, M.J. 1992. Prey choice and substitution in Chilocorus spp. (Coleoptera: Coccinellidae). (South Africa) Bulletin of Entomological Research 82: 327-334.

Choice between prey species by Chilocorus nigritus and C. bipustulatus adults and larvae was determined; these species were maintained on Aspidiotus nerii on Cucurbita moschata and Solanum tuberosum; strong preferences were absent and differences in predators' feeding histories were not reflected in their choices; deleterious effects of a prey substitution investigated; diet changes significantly retarded larval development rate, and subsequent adults were smaller than control individuals.

He, G., Cui, B., Bao, W. & Pu, Z. 1991. The effect of temperature on the survival, development and fecundity of three armored scales, Abgrallaspis cyanophylli, Aonidiella aurantii and Chrysomphalus sp. Natural Enemies of Insects 13(2):58-60. (In Chinese, English abstract)

Laboratory study of these three species at 5 temperatures; high degree of variation observed.

Hefetz, A., Kronenberg, S., Peleg, B.A. & Bar-Zakay, I. 1988. Mating disruption of the California Red Scale Aonidiella aurantii (Homoptera: Diaspididae). In Citriculture: Proceedings of the Sixth International Citrus Congress: Middle-East, edited by R. Goren and K. Mendel. Tel Aviv: March 6-11, 1988. (Pests and their Management; Integrated Control in Citrus Growth; Postharvest Physiology and Pathology, Vol. 3.) Rehovot, Israel: Balaban; 1121-1127.

Mating disruption as means of control was assessed using the synthetic sex pheromone; tests for efficacy of mating disruption included attraction of males to traps baited with low doses of pheromone, attraction to traps baited with virgin females and the mating success of virgin females in the field; communicative disruption occurred during all assays; applying the pheromone from several dispensers was in most cases superior to a single dispenser.

Hegazy, M.E., Dogheim, S.M., Abdel-razik, M. & Helmy, E.I. 1990 (1987). Efficacy and residual behaviour of Diazinon treated orange trees. Bulletin of the Entomological Society of Egypt (16):21-29.

Chemical treatment of Lepidosaphes beckii, destructive pest of the economically important citrus crop of Egypt investigated; data on persistance, penetration and half-life period are presented; reducing diazinon residues through removal of the entrasurface residues by a washing process was also evaluated.

Heidari, M. & Copland, M.J.W. 1992. Host finding by Cryptolaemus montrouzieri (Co., Coccinellidae) as a predator of mealybugs (Hom., Pseudococcidae). Entomophaga 37(4): 621-625. (In English, French abstract)

Adult C. montrouzieri were able to detect their prey by visual and chemical stimuli; presence of mealybug caused a significant increase in the number of turns and a sharp decrease in flight attempts suggesting detection by olfaction; in the light, adult predators found polystyrene dummies significantly faster than under dark (red light) conditions, but light had no effect on the time taken for adults to pass across an invisible test point; fourth instar larvae could only perceive the prey by physical contact.

Henderson, R.C., Hill, M.G. & Wigley, P.J. 1992. Freeze-dried artificial diets for three species of Chilocorus ladybirds. New Zealand Entomologist 15:83-87. [40th Annual Conference of the Entomological Society of New Zealand, May 12-15, 1992, Waikato, New Zealand]

Comparisons made among 3 insect diet bases used to rear these predators of armored scale insects; their prey include Hemiberlesia rapax and H. lataniae.

Hendricks, H.J. & Williams, M.L. 1992. Life history of Melanaspis obscura (Homoptera: Diaspididae) infesting pin oak in Alabama. Annals of the Entomological Society of America 85(4):452-457; ill.

Obscure scale is the primary insect pest of Quercus palustris in Alabama; life history studied on 257 pin oaks on the Auburn University campus from 1986 to 1988; single generation per year; overwintered primarily as second-instar males and females; 2nd instar males formed white, waxy cocoon before forming prepupae; observation of hardened ventral cover reported for the first time; accuracy of a degree-day model recorded for this speces' development was tested; model closely predicted crawler emergence but was less accurate for predicting adult male emergence.

Hendrickson, R.M., Drea, J.J. & Rose, M. 1991. A distribution and establishment program for Chilocorus kuvanae (Silvestri) (Coleoptera: Coccinellidae) in the United States. Proceedings of the Entomological Society of Washington 93(1):197-200.

This coccinellid predator of euonymus scale, Unaspis euonymi; introduced from Korea and Japan into the U.S.; released in 25 states in the east; became

established in 9 states.

Hennessey, R.D., Neuenschwander, P. & Muaka, T. 1990. Spread and current distribution of the cassava mealybug, Phenacoccus manihoti (Homoptera: Pseudococcidae), in Zaire. (Zaire) Tropical Pest Management 36(2):103-107.

P. manihoti widespread in West and Central Africa and spreading east; Epidinocarsis lopezi successfully introduced for control; damage and effectiveness of control discussed.

Hernandez, M., Ceballos, M. & Martinez, M.d.l.A. 1989. A new bioregulator of Saccharicoccus sacchari (Ckll.) (Homoptera: Pseudococcidae), pink mealybug, on sugarcane in Cuba. (Nuevo biorregulador para Saccharicoccus sacchari (Ckll.) (Homoptera: Pseudococcidae), chinche harinosa rosada de la cana de azucar en Cuba.) Revista de Proteccion Vegetal 4(1):81-82; ill. (In Spanish, English abstract)

Anagyrus species have been observed to be effective parasites for control of S. sacchari throughout the world; this paper reports the first observation of this parasite on this scale species on sugarcane for the first time in Cuba.

Hill, M.G., Allan, D.J. & Henderson, R.C. 1990. A laboratory study of the effects of Hydrogen cyanamide on Latania scale (Hemiberlesia lataniae). In Proceedings of the Forty Third New Zealand Weed and Pest Control Conference. Palmerston North, New Zealand: pp. 256-257.

Hemiberlesia lataniae common on kiwifruit; hydrogen cyanamide used to promote uniform, increased budbreak; experiments conducted on potato tubers infested with this species to determine insecticidal effect; results indicate that insecticidal properties do exist.

Hoebeke, E.R. & Wheeler, A.G. 1991. Anthribus nebulosus, a Eurasian scale predator in the eastern United States (Coleoptera: Anthribidae): notes on biology, recognition, and establishment. Proceedings of the Entomological Society of Washington 93(1):45- 50; ill.

Anthribus nebulosus introduced from Europe and released in Virginia in late 1970's for control of Physokermes hemicryphus, found on Picea spp.; other hosts include Parthenolecanium corni and Eulecanium tiliae.

Hoffman, E. & Smith, R.L. 1991. Emergence and dispersal of Margarodes meridionalis (Homoptera: Coccoidea) in hybrid bermudagrass. Journal of Economic Entomology 84(6): 1668-1671; ill.

Field studies done in Tucson, Arizona, where adult emergence occurred in June; all adults emerged from encysted stage by August; most adults migrated 5 cm from the cite of their emergence; 20 to 25% travelled up to 10 cm; dispersal was fossorial with no evidence of surface movement; emergence triggered by increased soil moisture.

Hofker, K., Conijn, C. & Van Alphen, J.J.M. 1991. Is the Iris mealybug Phenacoccus avenae Borchsenius able to multiply itself and spread in bulb fields in the Netherlands? (the Netherlands) Med. Fac. Landbouww. Rijksuniv. Gent 56(3 Part B):995- 1001.

[Forty Third International Symposium on Crop Protection, Part IV]

This species originally described from grasses in Armenia; found on bulbs, corms and rhizomes of Liliaceae, Iridacea and Amaryllidaceae imported into the Netherlands from Turkey; this paper suggests that it is unlikely that this species has become naturalized in the Netherlands.

Houston, K.J. 1991. Chilocorus circumdatus Gyllenhal newly established in Australia and additional records for Coccinella undecimpunctata L. (Coleoptera: Coccinellidae). (Australia) Journal of the Australian Entomological Society 30(4):341-342.

C. circumdatus recorded in Australia for the first time with Unaspis citri and Aspidiotus nerii as new prey records.

Howard, F.W. 1990. Insecticidal control of magnolia white scale and long-tailed mealybug on Sago palms. In Proceedings of the ... annual meeting of the Florida State Horticulture Society. Tampa, FL: October 31-November 2, 1989. The Society; 293-295.

Populations of Pseudaulacaspis cockerelli infesting Cycas revoluta were

reduced > 96% with a single application of dimethoate and two applications two weeks apart of methidathion; populations of Pseudococcus longispinus were eliminated from sago- palms, by single foliar applications of methidathion and chlorpyrifos and nearly eliminated by a single application of dimethoate.

Ishaaya, I., Blumberg, D. & Yarom, I. 1989. Buprofezin -- a novel IGR for controlling whiteflies and scale insects. (Israel) Med. Fac. Landbouww. Rijksuniv. Gent 54(3b): 1003-1008.

Buprofezin demonstrated to suppress embryogenesis of Aonidiella aurantii and Saissetia oleae resulting in significant decrease of crawlers and egg vitality; harmless to aphelinid parasites.

Ishaaya, I., Mendel, Z. & Blumberg, D. 1991/1992. Effect of buprofezin on California Red Scale Aonidiella aurantii (Maskell), in a citrus orchard. Israel Journal of Entomology 25-26:67-71.

Effectiveness of wettable powder (WP) and emulsifiable concentrate (EC) of buprofezin; Wp considerably less potent than the EC for control of this species; addition of 0.5% light medium grade mineral oil increased potency of the WP to a greater extent than that of the EC; rate of parasitism by Comperiella bifasciata and Aphytis spp. did not differ among treatments.

Itioka, T. & Inoue, T. 1991. Settling-site selection and survival of two scale insects Ceroplastes ceriferus on citrus trees. (Japan) Researches on Population Ecology 33(1):69-86; ill. (In English, Japanese abstract)

Preferred twigs of these two species were more profitable sites for survival after settling; most mortality was due to growth cessation, which is related to twig quality as a food source; found on Citrus unshiu in central Japan; predators and parasitoids were minor mortality factors.

Ivbijaro, M.F., Udensis, N., Ukwela, U.M. & Anno-Nyako, F.V. 1992. Geographical distribution and host range in Nigeria of the mango mealybug, Rastrococcus invadens Williams, a serious exotic pest of horticulture and other crops. (Nigeria) Insect Science and its Application 13(3):411-416; ill. (In English, French abstract)

This species is highly polyphagous on over 20 species of host plants in 12 different plant families ranging from fruit (43%) and food crops (14%) to shade trees and ornamentals (43%); severity of attack was based on number and area of foliage, inflorescence and fruits; most severe on mango, citrus, breadfruit, guava, oleander, frangipani and roses; also found on maize, pawpaw and croton; biological and chemical control discussed.

Jadhava, R.B., Kadu, I.K. & Varma, A. 1991. Occurrence of soft scale Aclerda takahashii Kuwana and its parasites in Maharastra, India. Journal Adv. Zool. 12(1): 70-71.

This species often found in association with Melanaspis glomerata; parasites include Neostymachus auraticorpus and Subprionomitus sp.

Jalali, S.K. & Singh, S.P. 1989. Biotic potential of three Coccinellid predators on various Diaspine hosts. (India) Journal of Biological Control 3(1):20-23.

Chilocorus bijugus, C. nigritus and Sticholotis madagassa were reared on 9 Diaspine hosts; predator preferences; developmental periods of predators; host consumption.

Jalaluddin, S.M., Mohanasundaram, M. & Sundara Babu, P.C. 1992. Influence of weather on fecundity potential of coconut scale Aspidiotus destructor Sing. (India) Indian Coconut Journal 22(12):5-7.

Number of eggs laid per female showed a significant positive correlation with maximum temperature and sunshine hours and negative relationship with evening relative humidity.

Jalaluddin, S.M., Mohanasundaram, M. & Sundara Babu, P.C. 1991. Toxicity of insecticides to the coconut mealybug Palmicultor sp. Indian Coconut Journal 22(4):15- 16.

Five chemical substances found to be successful in controling this Pseudococcid on coconut.

Jalaluddin, S.M., Thirumoorthy, S., Mohanasundaram, M., Chinniah, C. & Chinnaswami, K.N. 1991. Coccid complex of coconut in Tamil Nadu. (India) Indian Coconut

Journal 22(3):17; ill.

Among 25 species of insects attacking coconut are scale insects such as Aspidiotus destructor, Ceroplastes actiniformis, Vinsonia stellifera, Lecanium acutissimum, Coccus hesperidum, Pseudaulacaspis sp. Palmicultor sp. and Pseudococcus citriculus; description of damage; effectiveness of predators and chemical control discussed.

Jeger, M.J. & Thresh, J.M. 1993. Modelling reinfection of replanted cocoa by swollen shoot virus in pandemically diseased areas. (Great Britain) Journal of Applied Ecology 30:187-196.

Epidemiology of swollen shoot disease modelled and discussed; spread attributed to mealybug vectors such as Planococcus, Planococcoides and Phenacoccus.

Jhala, R.C., Patel, Z.P. & Shah, A.H. 1989. Occurrence of some new insect pests on mango in India. Gujarat Agricultural University Research Journal 14(2):103.

One scale insect mentioned as a new pest on mango in India: Eucalymnatus tessellatus.

Ji, L., Yang, J. & Shao, Y. 1991. A preliminary report on the biology of Hemisarcoptes sp. (Acari: Hemisarcoptidae), an important natural enemy of Willow Oyster-shell scale, Lepidosaphes salicina (Hom.: Diaspididae). Chinese Journal of Biological Control 7(4):151-153. (In Chinese, English abstract)

Nymph and adult of Hemisarcoptes found for the first time in China to prey on egg, nymph and adult of this scale species on poplar trees; over 40% of scale population infested during this survey; biology.

Jimenez R., M., Vargas C., H., Bobadilla G., D. & Gallo D., P. 1989. Detection of the globe-shaped olive scale Pollinia pollini (Costa) (Homoptera, Asterolecaniidae) in the third region of Chile, Copiapo. (Deteccion de la cochinilla globosa del olivo, Pollinia pollini (Costa) (Homoptera, Asterolecaniidae) en la III region de Chile, Copiapo.) IDESIA (Chile) 11:57-59; ill. (In Spanish, English abstract)

First record in Chile of this species; distribution; brief descriptions.

Jun, Y., Evans, H.C. & Bridge, P.D. 1990. Chemotaxonomy as a method of determining relationships within the genus Verticillium. In Proceedings and abstracts, Vth International Colloquium on Invertebrate Pathology and Microbial Control. Glen Osmond, Australia: 20-24 August 1990. p. 149.

Of six cluster groups delimited, one was tropical isolate from 13 strains of mainly Coccidae.

Kahn, A.D. 1992. Apple grape mealybug control 1991. Insecticide and Acaricide tests Vol. 17:45-47.

Evaluations of 6 chemical treatments on Malus domestica for control of Pseudococcus maritimus.

Kalaci, Z. & Erkin, E. 1988. An examination of Turkish Aphelinids and their world situation. (Turkiye aphelinid'leri ve dunyadaki durumlari uzerinde bir inceleme.) (Turkey) Turkiye Entomoloji Dergisi 12(2):113-123. (In Turkish)

28 species of Aphelinids; hosts include aphids and scales; distributions.

Kanika-Kiamfu, J., Kiyindou, A., Brun, J. & Iperti, G. 1992. Comparison of the biological potential of three coccinellids, predators of the cassava mealybug, Phenacoccus manihoti (Hom. Pseudococcidae). (Comparaison des potentialites biologiques de trois coccinelles predatrices de la cochenille farineuse du manioc Phenacoccus manihoti (Hom. Pseudococcidae).) (France) Entomophaga 37(2):277-282. (In French, English abstract)

Hyperaspis raynevali is the main species of coccinellid introduced from South America to control P. manihoti; other coccinellid introductions include Exochomus flaviventris and Diomus henneseyi; discussion of effectiveness of these three species.

Kannaiyan, J. & Sithanantham, S. 1991. Effect of pod infestation by mealy bugs on seed quality in groundnut. (Zambia) International Arachis Newsletter (9):16-17.

Unidentified mealybug found to be infesting roots and pods of groundnut, resulting in overall reduction in seed mass; this study investigates the extent of damage.

Karaca, I., Sekeroglu, E. & Uygun, N. 1987. Life tables of the California Red Scale, Aonidiella aurantii (Mask.) (Homoptera: Diaspididae) in laboratory conditions. (Kirmizi kabuklu bit (Aonidiella aurantii (Mask.) (Homoptera: Diaspididae)) in laboratuvar kosullarinda yasam cizelgesi.) (Turkey) Turkiye I. Entomoloji Kongresi : 129-138. (In Turkish, English abstract)

This species was transferred from infested field citrus fruits to squash; net reproduction rate measured; sex ratio observed to be 1:1; survival rate of females from 80% to 100%.

Karam, H.H. 1990. Aclerda takahashii (Homoptera: Coccoidea: Aclerdidae), a scale insect recorded for the first time in Egypt. (Egypt) Alexandria Journal of Agricultural Research 35(2):127-134; ill. (In English, Arabic abstract)

This species is hidden under leaf shield on sugarcane; description.

Khachatrian, M.G. 1990. Development of follicle epithelium in oogenesis of Ararat cochineal. Biologicheskii Zhurnal Armenii 43(5):383-387. (In Russian, Armenian and English abstract)

Study of the process of follicle epithelium development in polytrophic ovarioles of Porphyrophora hamelii; several distinguishing features of follicle epithelium development discussed.

Kinawy, M.M. 1991. Biological control of the coconut scale insect (Aspidiotus destructor Sign, Homoptera: Diaspididae) in the southern region of Oman (Dhofar). Tropical Pest Management 37(4):387-389.

Discussion of Chilocorus nigritus which was successfully introduced from India in 1985 to control this scale species infesting coconut palms.

Kinuthia, M.W. & Mwangi, R.W. 1990. The role of parasites and predators on the survivorship of Icerya pattersoni (Newst.) (Homoptera: Margarodidae), a coffee pest. In Integrated Pest Management in Tropical and Subtropical Cropping Systems '89. Bad Durkheim, Germany: February 8-15. Frankfurt, Germany: 587-595.

Most important parasites include Silvestria nr. minor and Tetrastichus sp.; other natural enemies include Scymnus, Anagyrus, Scutellista, Austroterobia, Dicrodiplosis, Cryptochetum and Chrysoperla pudica.

Klein, R.W., Kovac, D., Schellerich, A. & Maschwitz, U. 1992. Mealybug-carrying by swarming queens of a southeast Asian bamboo-inhabiting ant. Naturwissenschaften 79: 422-432.

This study reports that swarming queens of Tetraponeura sp. (Pseudomyrmecinae), a bamboo-inhabiting ant species, have been observed carrying pseudococcids.

Koteja, J. 1988. Eomatsucoccus gen. n. (Homoptera, Coccinea) from Siberian Lower Cretaceous deposits. (Poland) Polska Akademia Nauk. Instytut Zoologii. Annales Zoologici 42(3):141-163; ill. (In English, Polish & Russian abstract)

Alate males of Eomatsucoccus sukachevae and E. popovi, new gen. and species, described on the basis of four impressions; Eomatsucoccus is the oldest fossil that can be considered a scale insect, which indicates that coccids must have radiated into the main groups at least in the Jurassic.

Koteja, J. 1988. Review of Kiritshenkella Borchsenius and Balanococcus Williams, with a description of a new species (Homoptera, Pseudococcidae). (Poland) Polska Akademia Nauk. Instytut Zoologii. Annales Zoologici 42(3):119-140; ill. (In English, Polish & Russian abstract)

Seven species in each genus revised on the basis of literature data; keys provided; K. lianae, new species, described.

Koya, K.M.A., Devasahayam, S. & Kumar, T.P. 1991. Insect pests of ginger (Zingiber officinale Rosc.) and turmeric (Curcuma longa Linn.) in India. Journal of Plantation Crops 19(1):1-13.

46 species of insects infest ginger in the field and in storage; among them are Aspidiella hartii and A. curcumae; description of damage; life history, natural enemies; alternate hosts; control measures.

Kozar, F. & Footit, R.G. 1992. Tridiscus oetvoesi, new species, and some zoogeographic features of scale insect fauna of Canada (Homoptera, Coccoidea). (Canada) Acta Zoologica Hungarica 38(3-4):207-211; ill.

Description of this new species found in leaf sheaths of Agropyron sp. near

seacoast of Victoria, British Columbia; key to genus; speculation on number of scales likely to occur in Canada.

Kravchenko, M.A. 1989. Results of introduction of scale's entomophages. In Introduction and Use of Beneficial Arthropods for Plant Protection, edited by O. A. (Ed). Skarlato. Batumi, USSR: Sept. 5-9, 1988. Leningrad: Zoologicheskii Institut an SSSR; pp. 44-49. (In Russian
English abstract)

Recommendations for biological control of Ceroplastes japonicus, C. sinensis, Coccus hesperidum, Saissetia oleae, S. hemisphaerica, Lopholeucaspis japonicus, Quadraspidiotus perniciosus and Parlatoria oleae.

Kumar, M.G., Bhat, P.K. & Vijayalakshmi, C.K. 1989. Screening of kerosene and neem extract against coffee green scale. (India) Journal of Coffee Research 19(1):51-55.

Discussion of chemical control of Coccus viridis; three trials conducted to compare efficacy of various dosages against this species infesting one-year-old arabica seedlings; 1% kerosene and 2% neem-kerosene emulsion found effective under laboratory conditions.

Kumar, P. 1990. Record of Acacia auriculiformis A. Cunn. ex Benth. as a Kusmi lac host. Indian Forester 116(11):927; ill.

This new host record could be a promising alternative lac host for Laccifer lacca.

Lakshmanan, P., Kumar, S.M., Velusamy, R. & Indira, K. 1991. Loss of rice grain yield and seedling vigor due to sheath rot (ShR) and mealy bug interaction. (India) International Rice Research Newsletter 16(6)

Description of severe ShR Sarocladium oryzae outbreak in Sep-Oct 1990 in IR20 rice fields infected with Brevennia rehi; chaffy and discolored grains increased; seed germination and root length significantly reduced, but not shoot length.

Lambdin, P.L., Paulsen, D. & Simpson, J.D. 1993. Development and behavior of the walnut scale on flowering dogwood in Tennessee. Tennessee Farm and Home Science (166):26-29; ill.

Biology of Quadraspidiotus juglansregiae; seasonal development; natural enemies include Chilocorus stigma, Cheletomimus duosetosus, Tyrophagus sp. and Camissia sp.; alternate hosts include Acer saccharinum, Aesculus hippocastanum, Celtis occidentalis, Cladrastis kentukea, Fraxinus americana, Ilex crenata, Liriodendron tulipifera, Malus sp., Prunus caroliniana and Quercus palustris.

Lampson, L.J. & Morse, J.G. 1992. Impact of insect growth regulators on black scale Saissetia oleae (Olivier) (Homoptera: Coccidae) and inter-tree dispersal. Journal of Agricultural Entomology 9(3):199-210.

All tested materials significantly reduced black scale levels and compared favorably with carbaryl; however, timing of these treatments in relation to black scale phenology greatly affected effectiveness; dispersal also monitored to determine impact on trial; biology; biological control.

Lampson, L.J. & Morse, J.G. 1992. A survey of Black Scale, Saissetia oleae (Hom.: Coccidae) parasitoids (Hym.: Chalcidoidea) in Southern California. Entomophaga 37(3): 373-390. (In English, French abstract)

Four primary parasitoid species abundant: Metaphycus bartletti, M. helvolus, Scutellista caerulea and Diversinervus elegans; others include Marietta mexicana, Cheiloneurus noxius and Tetrastichus minutus.

Le Ru, B. & Iziquel, Y. 1990. An experimental study, with the aid of a rain simulator, of the mechanical effect of rainfall on populations of the cassava mealybug, Phenacoccus manihoti. (Etude experimentale, a l'aide d'un simulateur de pluies, de l'effect mecanique de la chute des pluies sur les populations de la cochenille du manioc, Phenacoccus manihoti.) Acta Ecologica / Ecologia Applicata 11(5):741-754; ill. (In French, English abstract)

Intensity of rain seems to be the most effective factor of mealybug elimination (about 22%); duration of rainfall has a lesser effect (less than 10%); those mealybugs which show symptoms of mycosis are twice as sensitive to mechanical action of rain than healthy ones.

Le Ru, B., Iziquel, Y., Biassangama, A. & Kiyindou, A. 1991. Variations in abundance and regulatory factors of the cassava mealybug, Phenacoccus manihoti (Hom.: Pseudococcidae), five years after the introduction of a neotroptical mealybug parasitoid, Epidinocarsis lopezi (Hym. Encyrtidae) into the Congo in 1982. (Variations d'abondance et facteurs de regulation de la cochenille du manioc Phenacoccus manihoti (Hom.: Pseudococcidae) cinq ans apres l'introduction d'Epidinocarsis lopezi (Hym.: Encyrtidae) parasitoide neotropical au congo en 1982.) (Congo) Entomophaga 36(4):499-511. (In French, English abstract)

Detailed study of the population dynamics and regulating factors of this mealybug five years after the introduction of the exotic parasitoid; peak populations are observed at the beginning of the rainy season and attributed to strong changes in the physiology of the host plant; the entomophthorale Neozygites fumosa is principally responsible for reduction of the pest; the ladybird Exochomus flaviventris remains the more active predator.

Le Ru, B., Reyd, G. & Mapangou-Divassa, S. 1990. Influence of ant exclusion on populations of Cassava mealybug Phenacoccus manihoti and its natural enemies in Congo. (Congo) Agronomie Tropicale 45(4):275-282. (In French, English & Spanish abstract)

A thick smear of birdlime at the base of cassava stems excluded ants and significantly reduced colonization by mealybugs; multiplication rate was not affected; predators Exochomus flaviventris and Epidinocarsis lopezi appeared in lower percentages but it did not influence their evolution during the dry season; differences in numbers observed on smeared and unsmeared stems seemed to be more linked with P. manihoti density than with presence of ants; this technique could increase the impact of the parasitoid E. lopezi, as it maintains low mealybug numbers.

Li, C. & Liao, D. 1990. Methods of mass rearing four citrus scale insects. Chinese Journal of Biological Control 6(2):68-70. (In Chinese, English abstract)

Aonidiella aurantii, Abgrallaspis cyanophyllis, Chrysomphalus aonidum and C. bifasciata successfully propagated on potato tubers and pumpkin; better growth and development of A. aurantii obtained on pumpkin than on potato; Parlatoria zizyphus failed to develop on either host.

Lim, T.K., Ibrahim, Y.B., Tang, M.K. & Liew, R. 1991. Occurrence of Aschersonia placenta and Hypocrella raciborskii on Asterolecanium ungulata in Durian (Durio zibethinus). (Malaysia) Biocontrol Science and Technology{}not on vtls 1:137-144; ill.

First record of A. placenta and H. raciborskii parasitizing the lecanoid scale Aschersonia placenta; determined by cultural, histopathological and scanning electron microscopy techniques.

Liu, Y. 1992. A new species of Asterodiaspis Signoret (Homoptera: Asterolecaniidae) from Yunnan Province, China. (China) Entomotaxonomia 14(1):22-25; ill. (In Chinese, English abstract)

Description of Asterodiaspis deformis.

Lockhart, B.E.L., Autrey, L.J.C. & Comstock, J.C. 1992. Partial purification and serology of sugarcane mild mosaic virus, a mealybug-transmitted closterolike virus. Phytopathology 82(6):691-695; ill.

This previously undescribed closterolike virus was found in 11 cultivars of Saccharaum sp. from Florida, Mauritius and Malawi; transmitted by Saccharicoccus sacchari.

Lohr, B., Varela, A.M. & Santos, B. 1991. Lifetable of Allotropa sp., (Hymenoptera: Platygasteridae), parasitoid of the cassava mealybug, Phenacoccus manihoti (Homoptera: Pseudococcidae). Zeitschrift fur Pflanzenkrankheiten und Pflanzenschutz 98(4):351-357. (In English, German abstract)

Allotropa sp. is gregarious endoparasitoid of P. manihoti; found in Paraguay and Brazil; studies of development, longevity, fecundity and host-parasitoid relationship.

Longo, S., Russo, A. & Mazzeo, G. 1991. Faunistic notes on Homoptera Coccoidea injurious to gen. Quercus in Calabria and Sicily. (Note faunistiche su Homoptera Coccoidea infeudati al gen. Quercus in Calabria and Sicily.) In

Phytopathological Problems of Quercus in Italy. Palazzo Medici Riccardi, Florence, Italy: November 19- 20, 1990. (Aspetti Fitopatologici delle Querce.) Florence: Associazione Fitopatologica Italiana; 10 pp. (In English Italian abstract)

Studies of scale insects living on oaks in these two regions have found 19 species from seven families; synonymy; origins; additional hosts.

Lourencao, A.L., Martens, F.P. & Alarcon, L.C.M. 1989. Occurrence of Eurhizococcus brasiliensis (Hempel) (Homoptera: Margarodidae) on grape at Louveira, state of Sao Paulo. (Ocorrencia de Eurhizococcus brasiliensis (Hempel) (Homoptera: Margarodidae) em videira no municipio de Louveira, estado de Sao Paulo.) (Brazil) Bragantia 48(2): 205-208. (In Portuguese, English abstract)

A survey on vineyards revealed limited, but in some cases fatal, damage to grape crop due to infestation of roots by this species; it is more serious pest in southern Brazil.

Mabbett, T. 1991. Olives and the olive fly. Agriculture International 43(6):164-165; ill.

This review of olive pests of Olea europaea mentions Saissetia oleae as a major scale pest.

Malawi, Ministry of Agriculture, Dept. of Agricultural Research. 1990. Macadamia entomology. Bvumbve Agricultural Research Station Annual Report. Malawi: 53-55.

Alarmingly high mealybug (Pseudococcidae) infestations at two sites were eventually controlled by chrysopid and coccinellid predators, and a tiny vasp parasite.

Mani, M. 1992. Contact toxicity of different pesticides to the encyrtid parasitoids, Aenasius advena and Blepyrus insularis of the striped mealybug, Ferrisia virgata. (India) Tropical Pest Management 38(4):386-390.

13 insecticides and 18 acaricides/fungicides tested; chlorpyriphos, carbaryl and fenthion showed highest residual activity to both parasites; most of the fungicides were harmless.

Mani, M. 1990. Rid the grape-vine of mealybug. Indian Horticulture 35(3):28-29; ill.

Maconellicoccus hirsutus menaces grape vines in India; damage described; species reared on pumpkin; among 15 natural enemies, Anagyrus dactylopii, Scymnus coccivora and Cryptolaemus montrouzieri tested for control; the most successful integrated pest management program described.

Mani, M. & Krishnamoorthy, A. 1991. Contact toxicity of synthetic pyrethroids to some parasitoids and predators of mealy bugs. Indian Journal of Plant Protection 19(1):93- 96.

Mealybugs are serious pests of citrus, grapes, and guava in India; 11 natural enemies and 3 synthetic pyrethroids tested for control.

Mani, M. & Krishnamoorthy, A. 1990. Further studies on the safety of pesticides to Anagyrus dactylopii (Hym., Encyrtidae) and Cryptolaemus montrouzieri (Coleop., Coccinellidae). Journal of Biological Control 4(2):80-85.

Five insecticides and ten fungicides at recommended field dosages evaluated for toxicity to these two enemies of Maconellicoccus hirsutus; fungicides except fosetyl- Al, dinobuton and dinocap were found harmless; several treatments became non-toxic between one day and seven days after treatment.

Mani, M. & Krishnamoorthy, A. 1989. Life cycle host stage suitability and pesticide susceptibility of the grape mealybug parasitoid Allotropa japonica, sp. n. Journal of Biological Control 3(1):7-9.

A. japonica is a Platygasterid parasitoid of the pink mealybug, Maconellicoccus hirsutus; culture maintained on pumpkin.

Marin L., R. 1990. Biology of Icerya purchasi (Homoptera: Margarodidae). (Biologia de Icerya purchasi Maskell (Homoptera: Margarodidae).) (Peru) Revista Peruana de Entomologia 32:64-66. (In Spanish, English abstract)

Biology of cottony cushion scale studied on two host plants: Citrus sinensis and Citrullus sp.; no males found; Rodolia cardinalis found as predator.

Marotta, S. 1991. Contribution to the knowledge of Italian Eriococcidae (Homoptera Coccoidea Eriococcidae). (Contributo all concoscenze degli Eriococcidi italiani

(Homoptera Coccoidea Eriococcidae).) (Italy) Bollettino del Laboratorio di Entomologia Agr "Fil Sil" 48:155-169; ill. (In Italian, English abstract)

Nine species of felted scale insects from Italy recently collected for the first time: Eriococcus agropyri, E. micracanthus, E. roboris and Greenisca brachypodii; synonymies; descriptions; hosts; distributions.

Marotta, S. 1992. Research on Pseudococcids (Homoptera: Coccoidea) from central Italy. (Ricerche su pseudococcidi (Homoptera: Coccoidea) dell'Italia centro-meridionale.) (Italy) Bollettino del Laboratorio di Entomologia Agr "Fil Sil" 47:63- 111; ill. (In Italian, English abstract)

New data on 32 species of mealybugs from Campania, Tuscany, Umbria and Sardinia; 11 species new to Italy are reported (Antonina graminis, Atrococcus cracens, Balanococcus orientalis, Dysmicoccus mackenziei, Heliococcus radicicola, Nipaecoccus delassusi, Peliococcus manifectus, Phenacoccus incertus, Phenacoccus mespili, Planococcus halli, Rhizoecus albidus and R. gentianae); Planococcus halli is considered dubius; Dysmicoccus pietroi and Phenacoccus neohordei are described as new species; synonymy; taxonomy; descriptions; hosts; habitat; geographical descriptions; key to 35 Italian genera of Pseudococcidae.

Masamdu, R. 1989. Factors influencing the effectiveness Metaphycus baruensis Noyes (Hymenoptera: Encyrtidae) in parasitising Coccus spp. (Hemiptera: Coccidae) on coffee in Papua New Guinea. PNG Coffee 8(2):89-91.

Coccus viridis and C. celatus are the most important pests of coffee in Papua New Guinea; they occur throughout the coffee growing areas causing significant yield reductions; Metaphycus baruensis was introduced for biological control; factors limiting its effectiveness include protection of crawlers by ants in galleries and inability of parasite to parasitize crawlers.

Maschwitz, U., Dumpert, K., Botz, T. & Rohe, W. 1991. A silk-nest weaving Dolichoderine ant in a Malayan rain forest. (Malaysia) Insectes Sociaux 38:307-316; ill.

This nest of a possibly undescribed ant species was discovered to contain unidentified scale insects.

Maschwitz, U., Fiala, B., Moog, J. & Saw, L.G. 1991. Two new myrmecophytic associations from the Malay Peninsula: ants of the genus Cladomyrma (Formicidae, Camponotinae) as partners of Saraca thaipingensis (Caesalpiniaceae) and Crypteronia griffithii (Crypteroniaceae). (Malaysia) Insectes Sociaux 38:27-35; ill.

Unidentified coccids and pseudococcids are cultivated within the internodes of the plant hosts that provide nests for these ants.

Matile-Ferrero, D. 1991. Parlatoreopsis citri sp. nov., a new Diaspidid living on citrus in Madagascar (Homoptera, Coccoidea). (Parlatoreopsis citri n. sp. Diaspididae nouveau vivant sur citrus a Madagascar (Homoptera, Coccoidea).) Revue Francaise d'Entomologie (N.S.) 13(3):137-140; ill. (In French, English abstract)

Description of adult female and second instar female; similar to P. pyri and P. tsugae; originally from Southeast Asia.

Matile-Ferrero, D. & Le Ruyet, H. 1985. New scale species from the Tai tropical rain forest in Ivory Coast (Homoptera, Coccoidea). (Cochenille nouvelles du massif forestier de Tai, en Cote d'Ivoire (Homoptera, Coccoidea).) Revue fr. Ent. (N.S.) (N.S.) 7(5):257-272; ill. (In French, English abstract)

Descriptions of three new genera (Couturierina, Richardiella and Stricklandiella); and eight new species (Asterolecanium louiserussellae, Coccus delottoi, Couturierina piptadeniastrae, Cascardia hodgsoni, Platysaissetia fouabii, Richardiella taiensis, Udinia lindae and Stricklandiella williamsi) of Coccoidea; from Asterolecanidae, Coccidae and Pseudococcidae families.

McClure, M.S. 1988. The armored scales of hemlock. In Dynamics of Forest Insect Populations: Patterns, Causes, Implications. Berryman, Alan A., Ed. New York: Plenum Press. pp. 46-65.

Two scale species investigated: Fiorinia externa and Nuculaspis tsugae; distribution; biology and life history; hosts; interspecific competition and competitive exclusion; interactions with natural enemies, the most important of

which is Aspidiotiphagus citrinus; host vigor, stress, and scale fitness.

McClure, M.S. 1989. Importance of weather to the distribution and abundance of introduced Adelgid and scale insects. Agricultural and Forest Meteorology 47(2-4): 291-302.

Five Homoptera that were accidentally introduced from Asia have become serious pests of two important forest tree species in northeastern U.S.; among them are the following scales: Fiorinia externa, Matsucoccus matsumurae and Nuculaspis tsugae; wind, extremes of temperature and heavy rain influences their distribution and abundance by affecting their dispersal and establishment.

McNamara, J.E.C. 1991. First Canadian record of Rhyzobius lophanthae (Blaisdell) (Coleoptera: Coccinellidae). (Canada) Coleopterists' Bulletin 45(2):196-197.

This coccinellid is found in association with Carulaspis juniperi on semimature giant sequoia, Sequioadendron giganteum at Victoria, British Columbia; it was originally introduced into California from Australia for trials against the black scale, Saissetia oleae; became established as a predator of armoured scales (Diaspididae) on citrus.

Mead, F.W.,.Ed. 1991. Technical report: Bureau of Entomology. Tri-ology 30(10):1/2.

List of pests cited in Florida; six scales mentioned; hosts; locations; degree of infestations.

Mendel, Z., Zehavi, A., Tam, S. & Madar, Z. 1991. Colonization trials with Cryptochetum iceryae and Rodolia iceryae for improved biological control of Icerya purchasi in Israel. (Israel) Biological Control 1(1):68-74.

C. iceryae developed on I. purchasi growing on 17 host plant species during rearing experiments; R. iceryae could not complete its development on either I. purchasi or I. aegyptiaca; two years after release at nine sites planted with Erythrina corallodendrum, Spartium junceum or Retama raetam and infested with I. purchasi, it is still unknown whether C. iceryae has become established.

Mendel, Z., Zehavi, A., Tam, S. & Madar, Z. 1990. The Israeli pine blast scale, Matsucoccus josephi, and its relation to forest fires. Hassadeh 70(4):603-608. (In Hebrew, English abstract)

Damage from M. josephi becomes conspicuous 20-25 years after planting or natural regeneration; extensive drying of branches occurs from below to top; overstory is also opening increasing production of the understory; premature bark peeling occurs followed by resin exudation; change of ground cover indirectly increases the amount of potential fuel for fire.

Miller, D.R., Liu, T. & Howell, J.O. 1992. A new species of Acanthococcus (Homoptera; Coccoidea; Eriococcidae) from sundew (Drosera) with a key to the instars of Acanthococcus. Proceedings of the Entomological Society of Washington 94(4):512-523; ill.

Description of Acanthococcus droserae, the first U.S. species of Acanthococcus that possesses dome-shaped setae and lacks a denticle on the claw; adult male also is unusual in that it has clear areas on the scutum, a character that occurs in the Coccidae and Margarodidae.

Miller, D.R. & Miller, G.L. 1993. Eriococcidae of the Eastern United States (Homoptera). Contributions of the American Entomological Institute 27(4):1-91.

The first detailed treatment of the Eriococcidae of the eastern United States; this study increases the number of described species occurring in the eastern U.S. from 18 to 37 species in 6 genera; 16 new species; keys; descriptions; illustrations.

Miller, D.R. & Miller, G.L. 1993. A new species of Puto and a preliminary analysis of the phylogenetic position of the Puto group within the Coccoidea (Homoptera: Pseudococcidae). Jeffersoniana: Contributions from the Virginia Museum of Natural History (4):1-35; ill.

Three instars of the female and five instars of the male Puto kosztarabi are described and illustrated. This represents the first described species from eastern North America. A checklist of the known species of Puto, keys to the adult male Puto, North American female Puto, and instars to P. kosztarabi are included. A cladistic analysis utilizing 23 taxa and 38 characters supports the monophyly of the Puto group.

Miyanoshita, A., Tatsuki, S., Kusano, T. & Koichi, F. 1991. Variation of esterase isozymes in Aspidiotus cryptomeriae. (Japan) Japanese Journal of Applied Entomol. & Zool. 35:317-321. (In Japanese, English abstract)

Variation in esterase isozymes of three host races of this species, associated with Cryptomeria japonica, Torreya nucifera and Taxus cuspidata analyzed by polyacrylamidegel electrophoresis; comparisons made between collection years and among localities within each host race; the results suggest the presence of differentiated host specificity in A. cryptomeriae.

Moore, D. 1988. Agents used for biological control of mealybugs (Pseudococcidae). Biocontrol News & Information 9(4):209-225.

Parasitoids have been the most successful agents, especially the Encyrtidae; the only effective predator is Cryptolaemus montrouzieri; other discussions focus on interactions between parasitoids and predators, and pathogens; CAB CIBC database of records of parasitoid species released for biological control, BIOCAT, mentioned.

Moore, D. & Cross, A.E. 1992. Competition between two primary parasitoids, Gyranusoidea tebygi Noyes and Anagyrus mangicola Noyes, attacking the mealybug Rastrococcus invadens Williams and the influence of a hyperparasitoid Chartocerus hyalipennis Hayat. (Great Britain) Biocontrol Science and Technology 2(3):225-234.

Both primary parasitoids were capable of eliminating the mealybug host but on occasion the parasitoids became extinct before the mealybugs; three of four parasitoids known to attack G. tebygi also attacked A. mangicola; the latter species was more heavily parasitized than the former, especially by the gregarious species Chartocerus hyalipennis; situation discussed in which the primary parasitoids were in direct competition.

Mopper, S., Maschinski, J., Cobb, N. & Whitham, T.G. 1991. A new look at habitat structure: consequences of herbivore-modified plant architecture. In Habitat Structure: the Physical Arrangement of Objects in Space, edited by S. S. Bell, E. D. McCoy & H. R. Mushinsky. Chinsegut Hill Conference Center, University of South Florida: May 1988. (Population and Community Biology Series.) London, U.K.: Chapman & Hall; 260-280; ill.

Topics covered include how herbivores influence plant architecture, consequences for plants, and evolution of plant form; Matsucoccus acalyptus is used as one example of an infestation simplifying plant architecture by creating a spindly, denuded tree canopy.

Morales, C.F., Hill, M.G. & Walker, A.K. 1988. Life history of the sooty beech scale (Ultracoelostoma assimile) (Maskell), (Hemiptera: Margarodidae) in New Zealand Nothofagus forests. New Zealand Entomologist (11):24-37; ill.

Descriptions of adult females, 4 female instars and 5 male instars; biology; description of honeydew production and effect on host; parasites found include a pteromalid (Hymenoptera) and its hyperparasite, and a melandryiid (Coleoptera); a clerid (Coleoptera) was found feeding on live scales; caterpillars of the families Oecophoridae and Coleophoridae were found associated with scale tests but their role is uncertain; life history is compared with other margarodids in New Zealand and elsewhere.

Moreno, D.S. & Luck, R.F. 1992. Augmentative releases of Aphytis melinus (Hymenoptera: Aphelinidae) to suppress California Red Scale (Homoptera: Diaspididae) in southern California lemon orchards. Journal of Economic Entomology 85(4):1112-1119.

Releases of this aphelinid, timed in the spring to coincide with the presence of virgin adult female Aonidiella aurantii, reduced the percentage of infested fruits at season's end in two sets of southern California lemon orchards when compared with those in nonrelease orchards; percentage of infested fruit did not differ with the level of release; releases did not reduce scale densities on twigs or the number of males caught in traps baited with pheromone from this species; this is consistent with known preference for larger female scales.

Mori, K. & Harashima, S. 1991. Assignment of (6R*,10R*) - relative stereochemistry to

the major component of the sex pheromone of the maritime pine scale, Matsucoccus feytaudi. (Japan) Tetrahedron Letters 32(42):5995-5998.

The HNMR spectrum of (6S,10S)-1 coincided with that reported for the major component of the sex pheromone of M. feytaudi.

Morse, J.G., Arbaugh, M.J. & Moreno, D.S. 1985. California red scale: computer simulation of CRS populations. California Agriculture 39(5-6):8-10; ill.

Aonidiella aurantii is one of three major arthropod pests of citrus in California, causing an annual economic crop loss (citrus) of approximately $15 million; causes reduced tree vigor and twig and branch dieback; management relies heavily on biological control which is more effective in southern California desert production areas than in the San Joaquin Valley; concern over the potential development of pesticide resistance as has been noted in Israel and South Africa; pheromone monitoring devices are being incorporated into control programs to improve timing.

Murphy, S.T. 1991. Insect natural enemies of coffee green scales (Hemiptera: Coccidae) in Kenya and their potential for biological control of Coccus celatus and C. viridis in Papua New Guinea. Entomophaga 36(4):519-529. (In English, French abstract)

Surveys conducted in Kenya to find natural enemy species suitable to Papua New Guinea; primary parasites in central highlands found Metaphycus stanleyi, M. baruensis and Diversinervus stramineus to be dominant on C. celatus and C. alpinus; other predators were found to be common only in ant-free scale populations; Coccophagus rusti was the only natural enemy of C. viridis found.

Myburgh, A.C. 1990. Crop Pests in Southern Africa, Vol. 5: Flowers and Other Ornamentals. Pretoria: 98 pp.; ill. (Bulletin -- Plant Protection Research Institute, No. 419.)

About 100 serious pests revieved; organized by plants they attack, parts on which damage is caused, and insect type; 47 scales mentioned; brief field descriptions; hosts; keys to aid in pest identification; Afrikaans names for species given.

Nalepa, C.A., Drea, J.J. & Bryan, M.D. 1992. Release and establishment of Chilocorus kuwanae (Coleoptera: Coccinellidae) in North Carolina. Report of Activities (NCDA BioControl Laboratory) :18-21.

This predator imported from Korea and successfully established in for control of Unaspis euonymi.

Nambiar, S.S. & Yoy, P.J. 1988. Pest management in coconut. In Six Decades of Coconut Research. Aravindakshan, M., Nair, R. R. & Wahid, P. A., Eds. Trichur, India: Kerala Agricultural University. pp. 103-113.

The most devastating of the coconut pests are the rhinoceros beetles, the red palm weevils, the black headed caterpillars and root grubs. Mealybugs (Pseudococcus sp.) are also widely distributed and implicated in various diseases. Recommended control measures are discussed.

Narasimham, A.U. 1987. Scale insects and mealybugs on coffee, tea and cardamom and their natural enemies. Journal of Coffee Research 17(1):7-13.

Although a large number of coccoids are recorded on coffee and tea, only a small number are of economic importance, such as Planococcus, Coccus viridis and Saissetia coffeae. Approaches to biological control are discussed.

Narayana Rao, M. 1989. A crawler-proof cage for breeding mealybugs and their natural enemies. (India) Journal of Biological Control 3(1):70; ill.

Seven species of mealybugs were raised on Cucurbita moschata in these specially designed cages: Ferrisia virgata, Nipaecoccus viridis, Planococcus citri, P. lilacinus, Pseudococcus longispinus, Rastrococcus iceryoides and R. invadens; description and advantages of cages discussed.

Nelson, C.R., Haws, B.A. & Nelson, D.L. 1990. Mealybugs and related Homoptera of shadscale: possible agents in the dieoff problem in the intermountain west. Gen. Tech. Rpt., Int. (U.S. For. Serv.) (No. 276):152-165; ill.

Results of this survey of Homopteran fauna associated with Atriplex confertifolia found eight coccoid species in eight genera and four families; relationships between coccoids and the health of individual plants summarized.

Nenon, J. & Fabres, G. 1991. Methodological study of the effectiveness of a neotropical hymenopterous encyrtidae Epidinocarsis lopezi introduced to Africa for control of the cassava mealybug Phenacoccus manihoti; review of French-Congolese research. (Etude methodologique de l'efficacite parasitaire d'un hymenoptere encyrtidae neotropical Epidinocarsis lopezi introduit en Afrique pour lutter contre la cochenille du manioc Phenacoccus manihoti; bilan des travaux Franco-Congolais.) (Congo) Insect Science and its Application 12(5/6):605-611. (In French, English abstract)

Both field and laboratory studies; biology; physiology; behavior; ecology; success.

Nurmamatov, A.M. & Bazarov, B.B. 1991. Zoogeographical review of the fauna of mealybugs (Homoptera, Pseudococcidae) of Tadzhikistan. (USSR) Entomological Review 70(6):100-103. (In English)
[Originally published in Entomologicheskoye Obozreniye, No. 4, 1990, pp. 810-813.]

86 species from 28 genera are found to occur in Tadjikistan; 3 major faunistic groups: valley, mountain and ubiquitous species.

Park, J.D., Koo, H. & Lee, W. 1992. Seasonal fluctuation of each stage, ovipositing and hatching behavior of Cerostegia japonicus Green (Homoptera: Coccidae) on persimmon tree. (Korea) Research Reports of the Rural Development Administration. Crop Protection 34(1):48-53.

Oviposition was begun from late May to mid-July; hatching nymphs, the effective stage for using insecticide, occurred from June to early August; adult females occurring from mid-October overwintered after mating; discussion of hatching rate related to temperature.

Park, S.C. & Abrahamson, L.P. 1991. Daily rhythm of pheromone production and release by females of the black pine bast scale Matsucoccus thunbergianae (Homoptera: Coccoidea: Margarodidae). Korean Journal of Applied Entomology 30(1):94-99. (In English, Korean abstract)

Cycles of both pheromone production and release peaked daily between 8 a.m. and 2 p.m., and decreased markedly after 4 p.m.; amounts of pheromone gradually decreased three days after the emergence; significance in synchronization of the daily rhythm of female pheromone release and activities of males and females with reference to reproductive success is discussed.

Patel, I.S., Jose, V.T., Shah, A.H. & Patel, U.G. 1989. Laboratory evaluation of some newer insecticides against mealybug, Coccidohystrix insolita G. of pigeonpea. Pestology 13(4):16-14.

Twelve insecticides were tested and compared with water treated control; the most effective treatments were Methyl parathion, Quinalphos and Monocrotophos.

Patel, J.A., Yagnik, M.S., Patel, D.B. & Tilva, D.G. 1991. An outbreak of mealy bug (Ceroplastodes cajani Maskell) at Pulses Research Station, Baroda, India. International Pigeonpea Newsletter (13):26.

Ceroplastodes cajani has been a sporadic pest of pigeonpea; a severe attack has been noticed during the rainy season; description of damage; chemical control.

Patil, A.S. & Hapase, D.G. 1992. Sugarcane pests management under drought conditions in Maharashtra. (India) Cooperative Sugar 23(8):531-533.

Among the sugarcane pests discussed is Melanaspis glomerata; susceptability of various sugarcane varieties reviewed; cultural and chemical control measures recommended.

Pedata, P.A. & Viggiani, G. 1991. Preliminary morpho-biological observations on Azotus perspeciosus (Girault) (Hymenoptera: Aphelinidae), hyperparasitoid of Pseudaulacaspis pentagona (Targioni Tozzetti) (Homoptera: Diaspididae). Redia 74(3): 343-350; ill.

This hyperparasitoid attacks all primary parasitoids of P. pentagona; morphology; biology.

Pellizzari-Scaltriti, G. 1991. Recent data on Italian fauna of Homoptera Coccoidea. (Recenti acquisizioni sulla fauna Italiana degli Homoptera Coccoidea.) Congresso

Nazionale Italiano di Entomologia 16:763-769. (In Italian, English abstract)
13 species from 5 families discussed; distribution; hosts.

Pijls, J.W.A.M., Hofker, C.D., Van Staalduinen, M.J. & Van Alphen, J.J.M. 1991. Interspecific host discrimination and competition in Epidinocarsis lopezi and E. diversicornis, parasitoids used for biological control of the cassava mealybug Phenacoccus manihoti. Redia 74-3:191-194.
This paper examines the failure of Epidinocarsis diversicornis to become established after E. lopezi, which currently keeps the cassava mealybug under control; each of these two parasitoids are able to recognize each other's oviposition mark, and avoid hosts already parasitized by the other; E. lopezi is by far the better competitor in multiparasitized hosts.

Pillai, S.R.M. & Gopi, K.C. 1990. Epidemic outbreak of mealybug Ferrisiana (Ferrisia ?) virgata Cockerell (Pseudococcidae: Homoptera) in Su-Babul Leucaena leucocephala Lam. De Wit plantations. (India) Indian Forester 116(10):822-824; ill. (In English, Tamil? abstract)
First record of this mealybug causing damage to Leucaena leucocephala in India; new natural predator recorded: Scymnus coccivora; another natural enemy found was Aenasius advena.

Podsiadlo, E. 1991. On the biology of Asterodiaspis variolosa Ratzeburg (Homoptera, Asterolecaniidae and its primary parasites (Hymenoptera, Encyrtidae) in Poland. Wiadomosci Entomologiczne 10(3):177-181. (In Polish, English abstract)
Synonymy of A. quercicola established; hosts include Quercus robur and Q. sessilis; primary encyrtid parasites include Habrolepis dalmani and Metaphycus asterolecanii; biology.

Porcelli, F. 1990(1992). New coccids in Italy. (Cocciniglie nuove per l'Italia.) Frustula Entomol 13(26):31-38; ill. (In Italian, English abstract)
Three species are reported for the first time in Italy: Chaetococcus bambusae, Odonaspis greeni and Aulacaspis tubercularis; new information about the occurrence of Phoenicoccus marlatti and Suturaspis archangelskyae is given.

Prinsloo, G.L. & Neser, O.C. 1990. The southern African species of Archenomus Howard (Hymenoptera: Aphelinidae) with a key to species of the world. Entomology Memoir (Republic of South Africa) (No. 79):26 pp.; ill. (In English, Africans abstract)
This tetramerous aphelinid genus appears to be exclusively parasitic in diaspidid scale insects; key to species.

Qin, T.K. 1991. Miscanthicoccus miscanthi (Takahashi) (Homoptera: Pseudococcidae) -- a new record from mainland of China. J. of GAC 10(1):53-55; ill. (In Japanese, English abstract)
Description; collected on Miscanthus floridulus; endemic to Asia; distributed also in Australia.

Qin, T.K. & Gullan, P.J. 1991. A new species of Kilifia De Lotto from Guizhou, China (Homoptera: Coccidae). Entomotaxonomia 13(1):21-24; ill.
This new species found on Myrsine semiserrata; description of adult female; second species of Kilifia found in China.

Qin, T.K. & Gullan, P.J. 1992. A revision of the Australian pulvinariine soft scales (Insecta: Hemiptera: Coccidae). Journal of Natural History 26:103-164; ill.
14 species described and illustrated; taxonomic history; new synonymy; key to adult females provided; host plants; distributions.

Quayyoom, M.A. & Lambdin, P.L. 1992. Observations on the disposition of oculata and lateral ocelli in selected Aphidoidea and Coccoidea taxa. Journal of the Tennessee Academy of Science 67(3):49-50; ill.
Various cephalic features of two aphid and two coccoid species evaluated to determine similarities among the taxa; scale species studied are Callipappus australis and Drosicha stebbingi (Green).

Quiroga, D., Arretz, P. & Araya, J.E. 1991. Sucking insects damaging jojoba, Simmondsia chinensis (Link) Schneider, and their natural enemies, in the North Central and Central regions of Chile. (Chile) Crop Protection 10(6):469-472.
This survey discusses several sap-sucking insects including the oleander scale, Aspidiotus nerii.

Rae, D.J. & Jones, R.E. 1992. Influence of host nitrogen levels on development,

survival, size and population dynamics of sugarcane mealybug, Saccharicoccus sacchari (Cockerell) (Hemiptera: Pseudococcidae). (Australia) Australian Journal of Zoology 40(3):327-342.

When adjusted for seasonal effects, nitrogen does not have a detectable effect on the size of mealybug populations on cane; in lab experiments, survival of immature S. sacchari and the size attained at the onset of the oviposition period was influenced by the level of nitrogen fertiliser applied to potted sugarcane; survival of this species increased up to a point and decreased at higher levels of soluble nitrogen.

Ram, S. & Pathak, K.A. 1987. Occurrence and distribution of pest complex of some tropical and temperate fruits in Manipur. (India) Bulletin of Entomology 28(1):12-18.

Four scale species mentioned as pests of fruits; hosts; distributions.

Raman, A. 1992. Galls induced by Mangalorea hoeae on Hopea ponga (Dipterocarpaceae) in southern India. (India) Insecta Matsumurana Part I(n.s. 47):1-10; ill. [This paper is Part I of Raman, A. and Takagi, S., Galls induced on Hopea ponga (Dipterocarpaceae) in southern India and the gall-maker belonging to the Beesoniidae (Homoptera: Coccoidea)]

Natural history of Hopea ponga; description and timing of gall formation; comparisons to galls of other species.

Raman, A. & Takagi, S. 1992. Galls induced on Hopea ponga (Dipterocarpaceae) in southern India and the gall-maker belonging to the Beesoniidae (Homoptera: Coccoidea). (India) Insecta Matsumurana (n.s. 47):1-32; ill. [This paper comprised of two parts, separately cataloged: Part I. Raman, A., Galls induced by Mangalorea hopeae on Hopea ponga (Dipterocarpaceae) in southern India; and Part II. Takagi, S., Mangalorea hopeae, a new Beesoniid (Homoptera: Coccoidea) inducing galls on Hopea ponga in southern India.]

Ramzan, A., Farhan, N. & Bhagat, R.C. 1991. Newly recorded scale insects (Coccoidea: Homoptera) from Kashmir Valley, India. Science and Culture 57(1-2):41-42.

Four species recorded for the first time from India: Hemiberlesia (Abgrallaspis) cyanophylli, Octaspidiotus multipori, Lepidosaphes (Lepidosaphes) salicina and Parlatoria thujae; hosts; biological notes; distribution.

Rao, V.L.V.P. & Rao, N.V. 1990. Integrated control of scale insect (Melanaspis Green) on sugarcane. (India) Bharatiya Sugar 15(10):60.

Six chemical treatments combined with trashing (stripping canes of all dry leaf sheaths) tested against Melanaspis glomerata, a serious pest in India.

Rebolledo R., R. & Carrillo LL., R. 1988. The seasonal cycle, phenology and host plants of Icerya purchasi Maskell in Valdivia, Chile. (Ciclo estacional, fenologia y plantas hospederas de Icerya purchasi Maskell en Valdivia, Chile.) Revista Chilena de Entomologia 16:25-32. (In Spanish, English abstract)

Host plant Ulex europaeus; species behaved like a bivoltine insect, with superposition of different developmental stages; polyphagous, infesting plants of 7 different families.

Reddy, A.R. & Lakshminarayana, K. 1988. A new record of mealybug, Maconellicoccus hirsutus Green as a pest on grapevine, Vitis vinifera L. in Andhra Pradesh. (India) Indian Journal of Entomology 49(3):449-450.

Mealybugs that have previously been recorded as a pest on grape in India include Pseudococcus maritimus, Ferrisiana virgata and Drosicha stebbingi; this is the first report of this scale pest on grape in India.

Reimer, N.J. & Beardsley, J.W. 1992. Epizootic of white halo fungus, Verticillium lecanii (Zimmerman) and effectiveness of insecticides on Coccus viridis (Green) (Homoptera: Coccidae) on coffee at Kona, Hawaii. In Proceedings of the Hawaiian Entomological Society. Honolulu, Hawaii: 1992. 73-81.

Four insecticides tested; effects on scale populations, plant growth and natural enemies reported; results indicate that Fluvalinate (Mavrik) caused dramatic decrease in green scale populations to levels near zero; Safter's soap, Volck oil and Superior oil show promise for incorporation into a green scale management program; Verticillium lecanii may be effective during wet areas.

Ren, S., Guo, Z. & Xiong, J. 1991. Population dynamics of natural enemies of Citrus

Arrowhead Scale, Unaspis yanonensis (Hom.; Diaspididae) in Guizhou Province. Chinese Journal of Biological Control 7(4):157-159; ill. (In Chinese, English abstract)

Results of field investigations conducted in a citrus growing region found 12 species of predators, 5 species of parasitoids and 2 fungal pathogens on U. yanonensis; the dominant natural enemy species differed in each grove; among them were Aphytis yanonensis, Chilocorus bijugus, C. hupehanus and Cybocephalus nipponicus.

Reyd, G. & Le Ru, B. 1992. Predation by Hyperaspis raynevali and Exochomus flaviventris larvae (Col. Coccinellidae) on cassava mealybug Phenacoccus manihoti (Hom. Pseudoccidae) colonies. Experimental study in laboratory. (Influence de la predation des larves d'Hyperaspis raynevali et d'Hexochomus flaviventris (Col. Coccinellidae) sur les colonies de la cochenille du manioc Phenacoccus manihoti (Hom. Pseudococcidae). Etude en conditions controlees.) (Congo) Entomophaga 37(2):317-325. (In French, English abstract)

Predation of coccinellid larvae was influenced by density and age structure of prey population of P. manihoti; prey/predator ratio less important; discussion of biological control.

Reyd, G. & Le Ru, B. 1992. Impact of predation by Coccinellid larvae on colonies of the mealybug Phenacoccus manihoti in crop lands. (Congo) Acta OEcologica 13(2):181- 191. (In English, French abstract)

Field study of impact of Exochomus flaviventris and Hyperaspis raynevali on P. manihoti; study affected by weather (rain), physiological state of host plant, and density and age structure of the prey.

Rodrigo, E. & Garcia-Mari, F. 1990. Comparison of the biological cycles of the diaspids Parlatoria pergandii, Aonidiella aurantii and Lepidosaphes beckii (Homoptera, Diaspididae) in citrus. (Comparacion del ciclo biologico de los diaspinos Parlatoria pergandii, Aonidiella aurantii y Lepidosaphes beckii (Homoptera, Diaspididae) en citricos.) (Spain) Bol. Sanid. Veg. Plagas 16(1):25-35; ill. (In Spanish, English abstract)

A naval orange orchard was sampled for one year to compare the recently designated pest species, Aonidiella aurantii (California Red Scale) with Lepidosaphes beckii and Parlatoria pergandii; the proportion of immatures was very high in A. aurantii populations; development of the generations can be faster on fruits than on leaves.

Ronse, A. & Matile-Ferrero, D. 1991. First observation in Belgium of Vryburgia brevicruris (McKenzie), a mealybug pest of succulent plants cultivated under glass (Homoptera, Pseudococcidae). (Premiere observation en Belgique de Vryburgia brevicruris (McKenzie), cochenille nuisible aux plantes succulentes cultivees en serre (Homoptera, Pseudococcidae).) (Belgium) Revue Francaise d'Entomologie (N.S.) 13(1):33-34. (In French, English abstract)

Short-legged mealybug; reported for the first time in Belgium; damages succulents and cacti in North America and a wide range of plants in Australia; found mainly on Asclepiadaceae in greenhouses in Belgium; originally described from California on Caralluma nebrowni; natural enemies include Leptomastix dactylopii and Leptomastidea abnormis.

Rosciszewska, M. 1992. Antennae of female Orthezioidea (Homoptera, Coccinea): morphology and sense organs. Zool. Jb. Anat. 122:343-359; ill.

Six major types of sense organs distinguished: cupolae, hair plates, intersegmental sensillae, coeloconic pegs, thin-walled pegs, and hairs; arrangement of these sense organs studied in 22 species; differences in antennae of Orthezioidea are of no taxonomic significance.

Rose, M. 1992. Biological control by natural enemies in the interior plantscape. College Station, Texas: Dept. of Entomology, Texas A & M. [Full-color poster.]

Photographs include Pseudococcus longispinus, Coccus hesperidum, Planococcus citri and Chrysomphalus aonidum and their natural enemies.

Rose, M., Rosen, D., Ren, H. & Wang, D. 1991. A new species of Aphytis (Hymenoptera: Aphelinidae) parasitic upon the arrowhead scale, Unaspis yanonensis (Kuwana), from the People's Republic of China. Entomotaxonomia 13(2):119-125; ill. (In

English, Chinese abstract)

Aphitis unaspidis, new sp., described and compared to others of the genus.

Rosen, D., Argov, Y. & Woolley, J.B. 1992. Biological and taxonomic studies of Chartocerus subaeneus (Hymenoptera: Signiphoridae), a hyperparasite of mealybugs. (Israel) Journal of Hymenopteran Research 1(1):241-253; ill.

Examination and redescription of this hyperparasite; reared on Pseudococcus longispinus on avocado; this species also attacks P. maritimus.

Rosenheim, J.A. & Rosen, D. 1991. Foraging and oviposition decisions in the parasitoid Aphytis lingnanensis: distinguishing the influences of egg load and experience. (Israel) Journal of Animal Ecology 60:873-893.

Two scale species were used as hosts for this parasitoid: Aspidiotus nerii and Aonidiella aurantii, both grown on Cucurbita moschata.

Russell, L.M. & Stoetzel, M.B. 1991. Inquilines in egg nests of periodical cicadas (Homoptera: Cicadidae). Proceedings of the Entomological Society of Washington 93(2): 480-488; ill.

Egg nests of brood X of 17-year periodical cicadas (Magicicada spp.) of 1987 were occupied by four orders of Insecta. Among them, species of Pseudococcidae and Eriococcidae (Homoptera) developed from eggs to adults. Mealybugs entered nests where unhatched cicada eggs and dead cicada nymphs were present; all other species occupied nests containing only cicada egg shells. Previously none of these insects were known to deposit eggs or to molt in periodical cicada egg nests.

Russo, A. & Mazzeo, G. 1992. Rhizoecus americanus (Hambleton) and Pseudaulacaspis cockerelli (Cooley) (Homoptera Coccoidea): pest of ornamental plants in Italy. (Rhizoecus americanus (Hambleton) and Pseudaulacaspis cockerelli (Cooley) (Homoptera Coccoidea) dannosi alle piante ornamentali in Italy.) Boll. Zool. agr. Bachic. Ser. II, 24(2):215-221; ill. (In Italian, English abstract)

Descriptions of these two newly recorded species for Italy; synonymy; morphology; taxonomy; distributions; hosts; key to identification.

Sadof, C.S. 1992. Scale insects on shade trees and shrubs. West Lafayette, IN: Dept. of Entomology, Purdue University Extension Service. 6 pp.; ill. (Ornamental insects.)

Topics covered include general scale life cycle, chemical and biological control; review of 15 common scales including brief field descriptions, hosts, and period of crawler activity; damage caused by infestation.

Sadof, C.S. & Neal, J.J. 1993. Use of host plant resources by the Euonymus Scale, Unaspis euonymi (Homoptera: Diaspididae). Annals of the Entomological Society of America 86(5):614-620; ill.

Patterns of this species' feeding and resource use were examined on Euonymus fortunei and E. japonica; intracellular stylet penetration was observed in stems, leaves, and leaf petioles; hypothesis supported that this species feeds primarily on cell contents (which differ markedly in green and yellow leaf portions) rather than phloem (which has similar composition in green and yellow leaf portions); scales may feed on a variety of plant tissues to optimize the nutritional value of ingested food.

Salem, M. & El-Saadany, G.B. Pheromone traps as monitors of the population of the red scale insect, Aonidiella aurantii (Mask.) in lemon orchards at Sharkeya, Egypt (Homoptera: Diaspididae). In Proceedings of the Conference of the Agricultural Development Research. Faculty of Agriculture, Ain Shams University: Dec. 17-19. pp. 129-138. (In English, Arabic abstract)

Monitoring of this severe pest of citrus was carried out for two years; description of technique; trap design; results indicate the most effective sites for trapping.

Santa-Cecilia, L.V.C., Matioli, J.C. & Ciociola, A.I. 1992. Effects of climatic factors on the pineapple mealybug Dysmicoccus brevipes (Cockerell, 1893) (Homoptera, Pseudococcidae) in the principal production regions of the state of Minas Gerais. (Brazil) Anais da Sociedade Entomologica do Brasil 21(1):135-145. (In Portuguese, English abstract)

Multiple linear regression analysis showed that the most important climatic

factor is rainfall, which has an adverse effect on pest populations; higher infestation levels were generally associated with lower values of relative humidity and maximum temperature.

Santas, L.A. 1989. Species of honeydew producing insects useful to apiculture in Greece. Entomologia Hellenica 7:47-48. (In English, Greek abstract)

Survey carried out to find more sources of honey production; 10 species listed, including two scale species: Aclerda berlesei and Physokermes piceae.

Sao Paulo de Souza, S. 1988. Population fluctuations of Mytilococcus beckii (Newman, 1896) (Homoptera, Diaspididae) in Pera, Valencia and Mandarina orange orchards in Guaiba, Rio Grande do Sul. (Flutuacao populacional de Mytilococcus beckii (Newman, 1869 (Homoptera, Diaspididae) em pomares de laranjeiras Pera, Valencia e Mandarina, no municipio de Guaiba, estado do Rio Grande do Sul.) (Brazil) Arquivos da Universidade Federal Rural (Rio de Janeiro) 11(1-2):51-58. (In Portuguese, English abstract)

Results showed that the Late Valencia cultivar was more infested than the others; climatic factors and natural enemies also important factors.

Sarkisov, R.N., Mkrtchian, L.P. & Zakharian, V.A. 1991. Birth-rate dependence of Ararat cochineal larvae compared among various methods of preserving eggs during the winter. Biologicheskii Zhurnal Armenii 44:228-230; ill. (In Russian, Armenian and English abstract)

Description of several methods of winter preservation of Ararat cochineal eggs; optimum conditions permitted success of more than 80% nymphs.

Seastedt, T.R. & Reddy, M.V. 1991. Fire, mowing and insecticide effects on soil Sternorrhyncha (Homoptera) densities in tallgrass prairie. Journal of the Kansas Entomological Society 64(2):238-242.

Densities of soil-dwelling Sternorrhyncha (most of which were scale insects) in tallgrass prairie significantly increased in response to application of a foliar insecticide (carbaryl) or mowing; spring burning of vegetation did not have a strong affect on total populations.

Seberg, O. 1991. Biogeographic congruence in the South Pacific. Aust. Syst. Bot. 4(1):127-136.

An attempt is made to see whether the cladograms for the circum-Pacific areas (South America, New Zealand, Tasmania and Australia) are congruent. The area cladograms are derived from Nothofagus (Fagaceae), Embothriinae (Protaceae), Oreobolus (Cyperaceae), Cyttaria (Helotiales), and Eriococcidae (Homoptera). The biological area cladogram is shown to be congruent with widely different geological hypotheses.

Sekeroglu, E., Uygun, N. & Karaca, I. 1989. The effect of different irrigation systems on population dynamics of California red scale (Homoptera: Diaspididae) on lemon trees in Adana, Turkey. (Turkey) Turkiye Entomoloji Dergisi 13(3):147-152. (In English, Turkish abstract)

Drip, furrow, under-tree sprinkler, and overhead sprinkler systems tested on Aonidiella aurantii on lemon; furrow and drip seemed most effective in limiting populations of this species.

Sharkov, A.V. & Voynovich, N.D. 1988. A new genus of encyrtids (Hymenoptera, Encyrtidae) from Northern Karelia and Finland. (USSR) Entomologicheskoe Obozrenie (Entomological Review) 67(4):826-830. (In Russian, English abstract)

A new genus, Aenigmaphycus is described for type-sp. A. paluster, new sp.; parasite of the soft scale Eulecanium douglasi on Betula nana.

Sharma, D.C., Rawat, U.S. & Pawar, A.D. 1990. Effect of temperature and humidity on the development, longevity and predatory potential of Pharoscymnus flexibilis Muls. on San Jose scale. Journal of Biological Control 4(1):11-14.

Optimum temperature and humidity observed to be 28 degrees C and 65% respectively; hibernation occurs at 22 degrees C and they could survive for more than 175 days; while at 37 degrees C they died within 5 to 10 days; average consumption of Quadraspidiotus perniciosus given at various temperatures.

Sharma, K.K. 1991. Laboratory rearing of Kerria lacca (Kerr) (Homoptera: Coccoidea: Tachardiidae) on the fruits of pumpkin, Cucurbita moschata. Current Science 61(8): 544-545; ill.

Indian lac insect, known for the commercial value of its secretions such as resin, wax and dye, requires plant hosts for its propagation; attempts to rear it on synthetic diet have been unsuccessful; in this experiment, they have been reared on pumpkin for the first time.

Siddappaji, C., Sreenivasa, K.N., Puttaraju, T.B. & Rajagopal, B.K. 1986. Orthezia insignis (Lantana bug) and Saissetia coffeae (Hemiptera: Coccidae) new pests of Jacaranda mimosaefolia. (India) Current Research (Univ. Agric. Sci. Bangalore) 15(3- 4):29-30.

Discussion of new host records of these introduced scale pests; previously Jacaranda mimosaefolia was commonly known to be attacked by Laccifer lacca and Drosicha leachii in India; Orthezia insignis is known as a notorious pest of ornamental plants in nurseries and greenhouses.

Silva, D.M.P.d. 1990. Occurrence of Calloeneis on cochineal in Alagoas. (Ocorrencia de Calloensis sobre a cochonil ha em Alagoas, Brazil.) Pesquisa Agropecuaria Brasileira 25(2):281-282. (In Portuguese, English abstract)

This natural enemy of Diaspis echinocacti was found during a survey of natural enemies.

Sinha, P.K. 1985. Dispersal and establishment behaviour during post-embryonic development of Ferrisia virgata (Homoptera). In Recent Advances in Developmental Biology of Animals. S.C. Goel & C.B.L. Srivastava, Eds. pp. 141-144.

Observations indicate that all instars are capable of withdrawing their stylets from the drying leaves and moving in search of a better site; maximum preference site for all instars is the under surface of the leaves, even when there are no direct sunrays falling on upper surface; progressively older nymphs prefer sites which are more firm and have more sap.

Sinha, P.K.e.al. 1983. Sex-ratio in Ferrisia virgata Ckll (Homoptera: Pseudococcidae). Biol. Bull. India 5(2):140-146; ill.

Sex-ratio studied on hosts Psidium guajava and Codium variegatum under semi- laboratory and field conditions; average ratio of male to female was 1:6.

Sinha, P.K. & Dinesh, D.S. 1984. A report on the coccids (Hemiptera: Coccoidea), their host plants and natural enemies at Bhagalpur. Biol. Bull. India 6(2):7-13.

Coccids found during surveys of fruit orchards and gardens include Icerya minor, Hemaspidoproctus sp., Aspidiotus destructor, Aonidiella orientalis, Pulvinaria sp., Chloropulvinaria polygonata, Ceroplastes pseudoceriferus, C. rubens, C. floridensis and Cerococcus indicus.

Sinha, P.K., Sayeed, M.Z., Singh, V.N. & Srivastava, A.K. 1985. Observations on the courtship and copulatory behaviour in the white-tailed mealybug Ferrisia virgata Ckll. (Hemiptera: Pseudococcidae) under laboratory conditions. Proceedings, National Academy of Sciences, India 55(Section B, Part I):1-5; ill.

Courtship period lasts from about 1 to 30 mintues; males invariably prefer younger adult females and reject nymphs and older females; copulatory period ranges from 15 to 25.

Skinner, M., Parker, B.L. & Bergdahl, D.R. 1991. Verticillium lecanii, isolated from larvae of pear thrips, Taeniothrips inconseuens, in Vermont. Journal of Invertebrate Pathology 58:157-163.

Pear thrips has recently become a major pest of sugar maple in the northeastern U.S.; V. lecanii, an entomopathogenic fungus, found to be widely distributed on pear thrips and potentially useful for control; this fungus also associated with declining, artificially elevated populations of beech scale, Cryptococcus fagisuga.

Srinivasan, T.R. & Sundara Babu, P.C. 1989. Field evaluation of Cryptolaemus montrouzieri Mulsant, the coccinellid predator against grapevine mealybug, Maconellicoccus hirsutus (Green). South Indian Horticulture 37(1):50-51.

Maximum effect of the predator was realized 6 weeks after the initial release to the extent of 64.3% control.

Stelzl, M. 1990. Food analysis of Hemerobiid nymphs (Insecta, Planipennia). Mitteilungen der Deutschen Gesellschaft fur Allgemeine und Angewandte Entomologie 7(4-6):670-676; ill. (In German, English abstract)

These larvae of the Neuropteran family Hemerobiidae are known to be

extremely stenophagous on aphids; this paper shows them to feed also on coccids, honeydew, etc.

Stiling, P. 1993. Why do natural enemies fail in classical biological control programs? American Entomologist 39(1):31-37.

Main reasons for failure seem to be related to climate, predation or parasitism by native fauna, and lack of alternative hosts or food; among species listed for the control of which natural enemies have been released are 29 scale species.

Sudoi, V. 1991. Effects of insecticides on mortality of fried egg scale (Aspidiotus sp.,Homoptera: Diaspidae (Diaspididae ?)) on tea. (Kenya) Tests of Agrochemicals and Cultivars (12):26-27.
[Supplement 118 to Ann. Appl. Biol.]

This species is a pest of tea in Kenya; also attacks coffee; chemical control difficult due to waxy covering on female; some success achieved by using insecticides mixed with industrial oils and timing application to coincide with male flight or crawler stage.

Sugonayev, E.S. & Voinovich, N.D. 1991. Peculiarities of parasitization of Chalcid wasp Encyrtus infidus (Hymenoptera, Chalcidoidea) on its host Eulecanium douglasi (Homoptera, Coccoidea) at high latitudes. Zoologicheskii Zhurnal 70(12):136-140; ill. (In Russian, English abstract)

Due to two-year host generation, seasonal cycle and character of parasitism of this chalcid wasp are modified: solitary parasitism in the host larvae transforms into gregarious one; acceleration of development and metamorphosis of the parasitized host takes place so that the parasite acquires some autonomy from seasonal cycle of the host; and parasite loses a part of its annual cycle -- the summer generation with the metapneustic larva, common for lower latitudes.

Sugonyaev, E.S. 1989. Some results of comparative studies of parasitic chalcids controlling wax scales in temperate zones of Eurasia and North America. In Introduction and Use of Beneficial Arthropods for Plant Protection, edited by O. A. (Ed). Skarlato. Batumi, USSR: Sept. 5-9, 1988. Leningrad: Zoologicheskii Institut an SSSR; pp. 49-52. (In Russian, English abstract) [Alternate transliteration of author's name: Sougonyaev]

Parthenolecanium and Eulecanium species, as well as their parasites, were used as examples of the important role of the analysis of biotas from various zoogeographic regions, and to identify goups and species of entomophages; theory proposed for suppression of the acacia wax scale in Europe by accidental introduction of the North American species, Blastotrix longipennis; identification of species promising for exchange between New and Old World.

Suris, M. & Varonna, I. 1988. Spatial distribution of Selenaspidus articulatus (Coccoidea: Diaspididae) in a Valencia orange grove. (Distribucion espacial de Selenaspidus articulatus (Coccoidea: Diaspididae) en una plantacion de naranjo Valencia.) (Cuba) Revista de Proteccion Vegetal 3(1):38-44. (In Spanish, English abstract)

Results indicate that this species does not show a homogenous distribution in the area, the plant nor the leaf.

Suris, M., Hernandez, N. & Varona, I. 1989. Analysis of a sampling procedure for Selenaspidus articulatus Morg. (Homoptera: Diaspididae) in citrus. (Analisis de un procedimiento de muestreo para Selenaspidus articulatus Morg. (Homoptera: Diaspididae) en citricos.) (Cuba) Revista de Proteccion Vegetal 4(1):1-8. (In Spanish, English abstract)

Evaluation of two sampling techniques used to ascertain abundance of the pest.

Swarbrick, J.T. & Donaldson, J.F. 1991. Host range studies with the Lantana mealybug Phenacoccus parvus Morrison. (Australia) Plant Protection Quarterly 6(2):68-69.

This Pseudococcidae has provided some control of the serious weed, Lantana camara; lists of observed field and greenhouse hosts; also list of apparently resistant species included.

Takabayashi, J. & Takahashi, S. 1993. Role of the scale wax of Ceroplastes ceriferus

Anderson (Hemiptera: Coccidae) as a defense against the parasitic wasp Anicetus ceroplastis Ishii (Hymenoptera: Encyrtidae). (Japan) Journal of Insect Behavior 6(1): 107-114; ill.

Study to determine effectiveness of adult wax covering on scale in preventing parasitization by wasp; when wax covering partially removed, 86% of host adults were parasitized compared with 20% with wax intact.

Takagi, M. 1991. Host stage selection in Aphytis yanonensis DeBach et Rosen and Coccobius fulvus (Compere et Annecke) (Hymenoptera: Aphelinidae), introduced parasitoids of Unaspis yanonensis (Kuwana) (Homoptera: Diaspididae). (Japan) Applied Entomology and Zoology 26(4):505-513.

Results indicate that the vulnerable stage of U. yanonensis is more restrictive to A. yanonensis than to C. fulvus; immature adult of U. yanonensis represents the only suitable host stage for oviposition by A. yanonensis, whereas C. fulvus exploits the entire adult stage.

Takagi, S. 1992. A contribution to Conchaspidid systematics (Homoptera: Coccoidea). (Malaysia) Insecta Matsumurana 46:1-71; ill.

Four species of Conchaspis (C. angraeci, C. vaccinii, C. buchananiae, new sp. and C. garciniae, new sp.) were collected in Peninsular Malaysia and studied by light microscopy and scanning electron microscopy; only two nymphal instars are recognized in the female as well as in the male.

Takagi, S. 1992. Mangalorea hopeae, a new Beesoniid (Homoptera: Coccoidea) inducing galls on Hopea ponga in southern India. (India) Insecta Matsumurana Part II(n.s. 47): 10-32; ill.

[This paper is Part II of Raman, A. and Takagi, S., Galls induced on Hopea ponga (Dipterocarpaceae) in southern India and the gall-maker belonging to the Beesoniidae (Homoptera: Coccoidea)]

Description and illustration of male and female; comparisons with other species.

Takagi, S. 1992. Mitulaspis and Sclopetaspis: their distributions and taxonomic positions (Homoptera: Coccoidea: Diaspididae). Insecta Matsumurana (n.s. 47):33-90; ill. (Systematic and Ecological Surveys on Some Plant-parasitic Microarthropods in Southeast Asia, Scientific Report No. 14.)

Six species (two new) and one new genus examined.

Tang, F., Hao, J., Shi, G. & Tang, Y. 1991. On a newly found genus and three new species of Diaspididae from China (Homoptera). Acta Entomologica Sinica 34(4):458- 464; ill. (In Chinese, English abstract)

New species Rhizaspidiotus taiyuensis, Tsugaspidiotus piceae and Parlatoreopsis acericola described; Tsugaspidiotus genus new to China.

Tertuliano, M. & Le Ru, B. 1992. Interaction between the cassava mealybug Phenacoccus manihoti and its plant hosts; study of amino acid and sugar levels. (Interaction entre la cochenille du manioc Phenacoccus manihoti et ses differentes plantes-hotes: etude de la teneur de la seve en acide amine et en sucre.) (Congo) Entomologia Experimentalis et Applicata 64:1-9. (In French, English abstract)

Five varieties of Manihot esculenta, M. esculenta X M. glaziovii, Euphorbia pulcherrina and Atlinum triangularae examined; variability in the total concentration of amino acid concentration was as great between varieties of cassava as at the species level; much less variability in the concentration of sugars at the intervarietal than at the interspecies level; different levels of resistance noted in the different plants were not associated with the concentrations of either amino acids or sugars, the ratios of sugar/amino concentrations or the amino acid compositions obtained from leaf extracts; this suggests that other aspects of plant chemistry confer resistance to cassava mealybugs.

Thakur, J.N., Rawat, U.S. & Pawar, A.D. 1988. Effects of commonly used fungicides on longevity and mortality of Encarsia perniciosi (Tower) and Aphytis sp. proclia group (Hymenoptera: Aphelinidae). (India) Journal of Biological Control 2(2):72-73.

These aphelinids are among the important parasitoids of San Jose scale,

Quadraspidiotus perniciosus throughout the world; in India fungicides have been required to control outbreaks of apple scab, Venturia inaequalis; the three fungicides (carbendazim (Bavistin), captafol (Difolatan) and captan (Hexacap)) tested for this study had no toxic effects on the adults of these parasitoids.

Thorarinsson, K. 1990. Biological control of the cottony-cushion scale: experimental tests of the spatial density-dependence hypothesis. Ecology 71(2):635-644.

According to the spatial density-dependence hypothesis, successful biological control is stabilized by parasitoid foraging behavior, such that increasing rates of parasitism accompany increasing local host (pest) density; experiments conducted on biological control of Icerya purchasi by Cryptochaetum iceryae on Pittosporum tobira; no spatial density dependence was found; rates of parasitism increased with scale body length, indicating parasite preference for larger hosts.

Tian, M. & Chen, S. 1991. Studies on the bionomics of Aleurodothrips fasciapennis (Thy. Phlaeothripidae), a predator of Diaspid scales on citrus. (China) Chinese Journal of Biological Control 7(2):64-66. (In Chinese, English abstract)

This predator feeds on all stages of scales, with a preference for the young; host species include Parlatoria pergandii, Chrysomphalus aonidum, Aonidiella aurantii, Lepidosaphes gloverii, L. beckii, Cornuaspis beckii, Temnaspidiotus destructor, Dialeurodes citri, D. citrifolii, Aleurocanthus woglumi, Diaphorina citri and Panonychus citri; overwintering occurs at all stages; distinctive population peak observed in early May; laboratory investigation shows that when there is a shortage of prey, the predator showed cannibalistic behavior.

Tomkins, A.R., Thomson, C., Wilson, D.J. & Greaves, A.J. 1992. Armoured scale insects (Hemiptera: Diaspididae) on unsprayed kiwifruit vines in the Waikato. New Zealand Entomologist (15):58-63.

Two generations of greedy scale (Hemiberlesia rapax) and oleander scale (Aspidiotus nerii) were found between December and May; few first generation scale insects of either species infested fruit with second generation scale infesting fruit from late January onwards; relative abundance of the 2 species on leaves and fruit differed with oleander scale infesting leaves to a lesser degree; greater proportion of oleander scale settled on the ventral surface of leaves and they were found in more protected sites on wood than greedy scale.

Tondeur, R., Schiffers, B.C. & Verstraeten, Ch. 1990. Differential susceptibility of Eupulvinaria hydrangeae Steinweiden (Homoptera: Coccidae) to 22 contact insecticides. (Comparaison d'efficacite de 22 insecticides de contact pour la lutte contre la cochenille pulvinaire (Eupulvinaria hydrangeae Steinweiden).) (Belgium) Med. Fac. Landbouww. Rijksuniv. Gent 55(2b):637-646. (In French, English abstract)

This species is the most noxious pest causing defoliation of urban trees; this report covers trials of insecticides adapted for urban use.

Tremblay, E. 1989. Coccoidea endocytobiosis. In Insect Endocytobiosis: Morphology, Physiology, Genetics, Evolution. Schwemmler, W. & Gassner, G., Eds. Boca Raton: CRC Press Inc. 145-173; ill.

This chapter reviews the endocytobiotic adaptations of 13 Coccoidea families, ultrastructural details, histochemical characteristics of endocytobionts, in vitro cultures of endocytobionts, classification of endocytobionts, asymbiosis and aposymbiosis, symbiont cycles, endocytobionts and sex determination, evolution of adaptations, and mutiple symbiosis and competition among the symbionts.

Tremblay, E. 1991. New entomological problems in the Mediterranean Basin and possibilities of their confrontation. In Proceedings of the 3rd National Entomological Congress, edited by Stergios and Harizanis, P. C. ,. Eds Paloukis. Thessaloniki, Greece: 9-11 October 1989. pp. 65-71.

Three types of risk of new pest introductions discussed: expansion of endemic species such as Matsucoccus feytaudi, penetration into a neighboring country of an exotic pest such as Unaspis yanonensis, and sudden appearance of an exotic pest due to direct introduction from anywhere such as Insulaspis

gloveri1 or Dysmicoccus spp. Ornamental pests and citrus pests reviewed; list of recent pest introductions, their origins and their hosts.

Turkmen, S., Goven, M.A. & Akkaya, A. 1992. Studies on the insect fauna of lentils in Southeastern Anatolia. (Guneydogu Anadolu Bolgesi'nde mercimek ekim alanlarinda bulunan bocek turleri ile onem durumlarinin tespiti uzerinde calismalar.) In Proceedings of the Second Turkish National Congress of Entomology. Izmir, Turkey: Ege Universitesi; 715-723. (In Turkish, English abstract)

Samples of lentil pests revealed 53 species (33 harmful and 20 useful); Porphyrophora polonica (Linnaeus) mentioned.

Umesh Kumar, N.N., Shree, M.P., Muthegowda & Boraiah, G. 1990. Changes in proteins, sugars, phenols and total chlorophyll content of mulberry plants affected by "Tukra". (India) Indian Journal Seric. 29(1):93-100. (In English, French abstract)

Tukra is a common disease of mulberry (Morus sp.) in tropical countries; Maconellicoccus spp. and Phenococcus hirsutus are known to transmit virus; descriptions of symptoms; healthy and diseased leaves of 10 mulberry varieties are compared.

Uygun, N., Karaca, I., Sekeroglu, E. & Ulyusoy, M.R. Integrated pest management studies in a newly established citrus orchard in Cukurova. (Cukurova'da yeni kurulan bir turuncgil bahcesinde zararliara karsi integre savas calismalari.) In Proceedings of the Second Turkish National Congress of Entomology. Izmir, Turkey: Ege Universitesi; 171-182. (In Turkish, English abstract)

Investigation of pest complex and natural enemies; Aonidiella aurantii was primary pest, brought with infected seedlings; control measures include pruning and other cultural practices, monitoring natural enemies and application of mineral oils.

Uygun, N. & Sekeroglu, E. 1987. Potential use of imported natural enemies for biological control in Cuckurova. Turkiye Entomoloji Kongresi Bildirileri :553-562. (In Turkish, English abstract)

[First Turkish Congress, Oct. 13-16, 1987, Izmir, Turkey]

Description and success of program to import and monitor natural enemies of insect pests, especially those pests damaging citrus; among those imported into Turkey are Comperiella bifasciata (to control Aonidiella aurantii), and Encarsia sp. (to control Dialeurodes citri).

Valand, V.M., Patel, J.I. & Shah, B.R. 1989. Effectiveness of different insecticides against brown scale -- Saissetia coffeae Wlk. on pointed gourd (Trichosanthes dioica Roxb.). (India) Pestology 13(7):17-21.

Insecticidal trials conducted under laboratory and field conditions revealed that cabaryl 0.2% and quinalphos .05% were effective against this scale species.

Valand, V.M. & Vyas, H.G. 1991. Control of Brown Scale Saissetia coffeae Wlk. (Homoptera: Coccidae) on pointed gourd with Aspergillus spp. Gujarat Agricultural University Research Journal 16(2):91-93.

This scale is an important pest of Trichosanthes dioica; Aspergillus niger and A. flavus identified as infecting S. coffea; experiments done to evaluate efficacy of these fungi for control.

Van Harten, A., Cox, J.M. & Williams, D.J. 1990. Scale insects of the Cape Verde Islands (Homoptera: Coccoidea). Courier Forsch.-Inst. Senckenberg 129:131-137; ill. (In English, German abstract)

35 species identified; two new species identified: a Planococcoides and a Ceroplastes; brief notes; hosts; distributions.

Varshney, R.K. 1992. A check list of the scale insects and mealy bugs of South Asia. Part-1. Records of the Zoological Survey of India (No. 139):1-152. (Occasional Paper.)

Total of 341 named species and subspecies in 117 genera are reported; excludes diaspids which will be covered in the second and last part; synonymy; distribution; host plants.

Velimirovic, V. 1990. Scales -- olive pests in southern part of Montenegro. (Yugoslavia) Acta Horticulturae 286:395-397.

8 scale species briefly discussed; damage; population changes; biological notes; natural enemies.

Venkatesulu, K. & Bhat, P.K. 1989. Insecticide application methods against the green scale on coffee. (India) Journal of Plantation Crops 16(Supplement):203-206. [Paper presented at the 7th Symposium on Plantation Crops, Coonoor, India, 16-19 October 1986]

Bio-efficacy of monocrotophos and dimethoate by the 'stem-implantation' method in the control of Coccus viridis varied greatly with the age and size of coffee plants; though appreciable reduction of pest shown on young coffee plants, severe phytotoxic symptoms were noticed on monocrotophos treated plants; less effective on older coffee plants; spraying method superior to 'stem-implementation' method.

Vogele, J.M., Agounke, D. & Moore, D. 1991. Biological control of the fruit tree mealybug Rastrococcus invadens Williams in Togo: a preliminary sociological and economic evaluation. (Togo) Tropical Pest Management 37(4):379-382.

This species was accidentally introduced into West Africa in early 1980's; controlled through introduced parasitoid Gyranusoidea tebygi; economic assessment concludes that this project has been successful and economical.

Walker, J.T.S., Markwick, N.P., Wearing, C.H., Shaw, P.W. & White, V. 1990. Pyrethroid insecticides for apple pest control: II. Field evaluation of mite and insect control. In Proceedings of the Forty Third New Zealand Weed and Pest Control Conference. Palmerston North, New Zealand: pp. 301-305.

Strains of synthetic pyrethroid (SP) insecticide-resistant Typhlodromus pyri were evaluated for several apple pests including Pseudococcus sp. and Eriosoma lanigerum.

Walker, J. 1990. Pests and pest control. In Nashi: Asian Pear in New Zealand. White, A. G., et al. Eds. Wellington, New Zealand: DSIR Publishing. 35-51; ill. (DSIR Information Series, No. 168.) [Chapter 4: Pests and Diseases.]

Most pests attacking nashi in New Zealand were accidentally introduced with early European settlement and are now widely established; mealybugs and scales discussed include Pseudococcus affinis, P. longispinus, P. calceolariae and Quadraspidiotus perniciosus; techniques for control include pesticides and integrated pest management (IPM).

Walker, P.W. & Allsopp, P.G. 1993. Factors influencing populations of Eumargarodes laingi and Promargarodes spp. (Hemiptera: Margarodidae). (Australia) Environmental Ecology 22(2):362-367.

This survey revealed E. laingi cyst numbers were influenced by soil type; Promargarodes spp. numbers did not differ between soil types, but there were differences between cultivars; there were more cysts of these two species in older crops; number of times the previous fallow was plowed and rotary hoed influenced E. laingi numbers, but not Promargarodes spp. numbers; Promargarodes spp. numbers were not influenced by insecticide applications; soil pH and electrical conductivity, ripping during fallow, type of irrigation, and nematicides did not affect numbers of either species.

Wallace, C. 1988. European fruit Lecanium, Parthenolecanium corni. Tri-ology 27(8)

The report by the Bureau of Entomology covers 5 incidences of scale infestations.

Washington, J.R. & Walker, G.P. 1990. Histological studies of California Red Scale (Homoptera: Diaspididae) feeding on citrus. Annals of the Entomological Society of America 83(5):939-948; ill.

Observations of citrus leaves, fruit and green twigs infested with Aonidiella aurantii; descriptions of stylet bundle, stylet length, frequency of stylets terminating in different tissues, pattern of damaged and healthy cells; parenchyma is the major feeding site; vascular tissue seems to be avoided by stylets, especially in leaves.

Waterhouse, D.F. 1991. Possibilities for the biological control of the breadfruit mealybug Icerya aegyptiaca on Pacific atolls. Micronesica (Suppl. 3):117-122.

This species is a major pest in Kiribati and elsewhere in Micronesia;

Rodolia pumila, predatory ladybird beetle, has been imported for control with limited success; suggestions made for additional control, such as additional introduction of Cryptochetum grandicorne.

Williams, D.J. 1961. Changes in nomenclature affecting some Coccoidea (Homoptera). Entomologist's Monthly Magazine 97(November 21):92-93.

Notes on Aulacaspis tubercularis, Rhizoecus falcifer and the genus Hypericicoccus.

Williams, D.J. 1992. A new genus and species of Conchaspididae (Hemiptera: Coccoidea) from Florida, remarkable in lacking legs. Journal of Natural History 26:1325-1331; ill.

Asceloconchaspis, new gen. described for Asceloconchaspis milleri, a new species from Florida; closely related to Fagisuga; key to four known genera of Conchaspididae provided.

Williams, D.J. 1993. A new species of mealybug from Greece, the first from Europe belonging to the ant-attended genus Eumyrmococcus Silvestri (Hemiptera: Coccoidea: Pseudococcidae). Entomologist's Gazette 44:216-220; ill.

Reviews benefits of mealybug association with ants; taxonomic background given for Eumyrmococcus; E. corinthiacus, new species, described and illustrated; carried by Plagiolepis species ant in Corinth; compared to E. scorpioides; key to four species of genus.

Williams, D.J. 1991. Superfamily Coccoidea in Hemiptera (Bugs, leafhoppers, cicadas, aphids, scale insects etc.), Carver, M., Gross, G. F. & Woodward, T. E. (Eds.). In The insects of Australia: a textbook for students and research workers (2nd Ed.). CSIRO (Ed.) Carlton: Melbourne University Press. pp. 457-464; ill. (, Vol. I, Chapter 30.)

Overview of the more than 6000 species of this superfamily; 840 are found in Australia; key provided to 13 families in Australia.

Wouters, J. & Verhecken, A. 1989. The scale insect dyes (Homoptera: Coccoidea). Species recognition by HPLC and diode-array analysis of the dyestuffs. Annls. Soc. ent. Fr. (N.S.) 25(4):393-410. (In English, French abstract)

Five historically and culturally important scale insect red dyes were investigated by high performance liquid chromatography, diode-array detection and data manipulation: Dactylopius coccus, Kermes vermilio, Porphyrophora polonica, P. hamelii and Kerria lacca; several new dye components and precursors were found and spectrally characterized in ultraviolet and visible light.

Wu, W. 1992. A new species of Bambusaspis (Homoptera: Coccoidea). Acta Entomologica Sinica 35(1):75-77; ill. (In Chinese, English abstract)

Adult female of Bambusaspis shenzhenensis described for the first time; found on Bambusa stenostachya.

Xu, Z. & Li, X. 1991. A new species of the Genus Anicetus (Hymenoptera: Encyrtidae) from China. Entomotaxonomia 13(3):219-221; ill. (In Chinese, English abstract)

Anicetus zhejiangensis, new sp., found on Ceroplastes ceriferus and C. japonicus.

Yardeni, A. & Rosen, D. 1992. Crawler phenology and generation development of the Florida wax scale, Ceroplastes floridensis (Homoptera; Coccidae), on citrus in different soils. (Israel) Alon Hanotea 46(9):622-629; ill. (In Hebrew, English abstract)

Duration of crawler appearance was longer on citrus in loam than in sandy soil; mean age, as expressed by weighted developmental stage, yielded a linear regression with time; number of generations per year, speed of development and size of ovipositing females also affected by type of soil.

Yashchenko, R.V. 1990. New species of the genus Porphyrophora (Coccinea, Margarodidae) from the East Kazakhstan. Zoologicheskii Zhurnal 69(5):143-145; ill. (In Russian, English abstract)

P. gigantea is newly described species; collected from roots of Elymus giganteus; similar to P. polonica.

Yehuda, S.B., Wysoki, M. & Rosen, D. 1992. Phenology of the honeydew moth, Cryptoblades gnidiella (Milliere) (Lepidoptera: Pyralidae) on avocado in Israel. Israel Journal of Entomology 1991/92:149-160.

This moth is often associated with coccoids sucha as Protopulvinaria pyriformis and their honeydew but may also infest avocado fruit as a primary pest; biology; host range.

Young, B. 1987. New species of the genus Fiorinia Targionia (Coccoidea: Diaspididae) from China. Contr. Shanghai Inst. Entomol. 7:123-134; ill. (In Chinese, English abstract)

Seven new species of Fiorinia described: F. camelleosae, F. citri, F. cunninghamiana, F. euonymi, F. fuzhouensis, F. keteleeriae, and F. myricae.

Zhang, X. 1992. A new species of the Bambusaspis (Homoptera: Asterolecaniidae). Journal of Nanjing Forestry University 16(1):53-54; ill. (In Chinese, English abstract)

Description of Bambusaspis huichowensis; collected on lower surface of leaves of Indocalamus sp.; similar to B. bambusae.

Zhang, Z. 1992. Description of a new genus and two new species of lac insects (Homoptera; Tachardiidae). (China) Oriental Insects 26:386-390; ill.

New genus, Albotachardina, A. yunnanensis and A. sinensis described from Yunnan, China occurring on Ficus benjamina and F. obtusifolia; subfamily Tachardininae; allied to Afrotachardina and Tachardina.

Zhang, Z. 1992. A new species of Metatachardia Chamberlin from Yunnan, China (Homoptera: Tachardiidae). (China) Oriental Insects 26:383-385; ill.

Description of adult female found on Ficus benjamina, Eriolaena malvacea and Dalbergia spp.; compared to Metatachardia myrica and M. conchiferata.

Zhang, Z., Chen, Z., Lin, J., Zhang, Y. & Gao, X. 1990. Feeding position of Laccifer lacca on Dalbergia balansae and the influence of parasitism on bark structure. Acta Botanica Sinica 32(9):680-685. (In Chinese, English abstract)

During feeding this species penetration in the bark by a stylet was mainly intracellular, seldom intercellular; distance of stylet; reaction of parenchyma cells; description of injury; etc.

Zhang, Z., Gou, Z., Qi, S., Wu, B., Guo, X. & Liu, X. 1990. A study of the oviposition biology of white wax insect Ericerus pela (Chavannes). (China) Zoological Research 11(4):311-315. (In Chinese, English abstract)

Observations indicate that female eggs are laid in an early stage and male eggs in a late stage.